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THE

NAVAL ANNUAL,

1914.

EDITED BY

VISCOUNT HYTHE, D.C.L., A.I.N.A.,

Honorary Fellow of Balliol; Commander of the Order of the Crown of Italy,

AND

JOHN LEYLAND.

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PREFACE.

THE *Naval Annual* appears this year somewhat later than usual. The delay in publication is due to the fact that during the early months my energies were concentrated on the endeavour to avert civil war and bring about a settlement of the Home Rule controversy by conference and consent. The duties of Editor have been in part undertaken by Mr. Leyland and Captain Robinson. The former is wholly responsible for the Review of the Progress of Foreign Navies, as well as for an interesting description of the German Dockyards which he has personally visited. Captain Robinson reviews as usual the progress of Armour and Ordnance, and also contributes a chapter on the Naval events of the Balkan War. The Review of the Progress of the British Navy is almost entirely the work of Mr. Richardson; the Editor is only responsible for the paragraphs dealing with general policy. Mr. Richardson also discusses the Influence of Loads on Ships' Speeds. We have been fortunate to secure articles on British and Foreign Air-craft and Wireless Telegraphy in the Navy by officers competent in these subjects, while Vice-Admiral Sir Edmond Slade contributes a very thorough survey of the arguments for and against the Right of Capture. The present volume contains fewer illustrations and rather less matter in Part IV. Owing to the failure of the firm who have been hitherto our publishers, a heavy loss was made over the volume for 1913. In the present volume the attempt has been made to somewhat reduce the expenses of publication without impairing the useful features of the book or the continuity of the series.

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PART I.

CHAPTER I.

BRITISH NAVY.

It is gratifying to all connected with the Navy that His Majesty has continued to show his great interest in the Fleet, among the most important of the demonstrations during the past year of his concern in its highest functions having been the visit, on June 30th, to Portsmouth to inspect H.M.A.S. Australia before her departure for the Commonwealth, there to be the flagship of the Australian Fleet. Again, in July, the King reviewed a great merchant fleet—some of the vessels being subsidised for service in war, and several fitted with quick-firing guns for defence against commerce destroyers of an enemy—drawn up in line on the Mersey, and having at their head the cruisers Lancaster and Liverpool. On this occasion, too, His Majesty opened the new graving dock of the Mersey Dock Board, adding one more to the number of such docks capable of taking the largest of warships as well as ocean liners.

In this connection, too, reference may be made to the visit in June of the President of the French Republic, who came to Spithead with the French Northern Squadron, and was received by H.R.H. the Prince of Wales with naval honours, the Second Battle Squadron, the First Light-Cruiser Squadron, and the Fourth Destroyer Flotilla being present. The Fifth Battle Squadron and the Fifth Cruiser Squadron were at Dover to honour the President's departure. An equally pleasant association of the French and British navies resulted from the visit paid to Cherbourg in February by the Third Battle Squadron, and in March by part of the First Battle Squadron; and from the visit to Brest in February by the First Battle-Cruiser Squadron and by the Second Cruiser Squadron. The combined Fleet cruising in the Mediterranean was at Athens at the end of November, and squadrons of the Home Fleets on their way home called at Naples, Toulon and Barcelona. The Fourth Battle Squadron was at

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Algiers in November. Palermo was also visited by some of our ships.

The Board of Admiralty

Regarding the *personnel* of the Board of Admiralty, the only change which has taken place since March 31, 1913, is the substitution of Captain C. F. Lambert for Rear-Admiral W. C. Pakenham on December 1, 1913.

The First Lord has continued to show unexampled zeal in furthering the interests of the Service, and in keeping himself thoroughly informed regarding the technique of all questions affecting its efficiency and welfare. He has visited the Royal Dockyards and the naval bases several times; he devoted the whole of May to a cruise in the Mediterranean, and in the autumn he inspected the important shipyards at Barrow and on the Clyde and Tyne, and also most of the naval ports and bases. The First Lord showed particular interest in all matters relating to the Naval Air Service, and made many flights in aeroplanes and seaplanes. No occupant of this high office of State has made corresponding effort to acquire a practical knowledge of the work of the Navy, but a word of caution is necessary. It is one of the cherished traditions of the Navy that the Board collectively is responsible for all decisions, and it is to be hoped that his zeal may not tend to his overstepping the due functions of the First Lord of the Admiralty, and interfering in matters which are the province of his professional advisers.

Admiralty organisation.

As to changes in the Admiralty's organisation, a new department, called the Navigation Department, was created during the year, and Captain Philip Nelson-Ward, M.V.O., R.N., was appointed the first Director of Navigation. The Hydrographer of the Navy was relieved of the work connected, under previous arrangements, with the Navigation Section of the Hydrographic Department. The post of Inspector of Target Practice has been abolished, and certain of the duties formerly carried out by his staff have been transferred to a new section of the Department of the Director of Naval Ordnance. A military officer is now attached to the Admiralty War Staff and a naval officer to the General Staff at the War Office, and thus a closer co-operation is ensured between the two branches of the force.

Fleet organisation.

Certain changes have been made in Fleet Organisation. Scotland has now been constituted a separate command, under a "Senior Naval Officer, Coast of Scotland," with headquarters at Rosyth. Two squadrons of light cruisers have been formed, one in full commission under a Commodore attached to the First Fleet and one in active commission attached to the Second Fleet. The Sixth Battle Squadron now consists of six ships. The Fourth Cruiser Squadron has been brought up to full commission, and has been

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detached for service in the West Atlantic. It will, however, return periodically to Home waters to join in manœuvres, with the exception of the light cruiser Hermione, reserved for station duties. The First Cruiser Squadron in the Mediterranean has been brought up to strength. The Second Battle-Cruiser Squadron at present comprises three ships, the Invincible being in dockyard hands for the removal of electric fittings in the gun turrets to be replaced by hydraulic gear. Four light cruisers of the "Town" class and a flotilla of sixteen G class destroyers ("Beagles") are now on the Mediterranean Station, and a considerable accession of strength is intended next year. The limits of the East Indies and China Stations have been modified, concurrently with the establishment of the new Australian (Commonwealth) Station, with limits as approved at the Imperial Conference, 1911, and Singapore and the waters adjacent now come within the East Indies command. The Swiftsure is flagship of the East India Squadron, and the Triumph is in reserve at Hong Kong. The first Fleet unit of the Royal Australian Navy, composed of one battle-cruiser, three light cruisers and three destroyers (to be joined shortly by two E class submarines), has replaced the old Australian Squadron. Three older light cruisers and a sloop remain on the New Zealand Division. H.M.S. Highflyer has been commissioned for the training of special entry cadets.

Fleet exercises.

The Naval Manœuvres took place at the end of July, and there were included the First and Second Fleet and part of the Third Fleet, with all the destroyer flotillas in Home waters, and the First Cruiser Squadron from the Mediterranean. In the Middle Sea there were manœuvres in November, the Mediterranean Fleet combining with the Fourth Battle Squadron, part of the First Battle Squadron, the Third Cruiser Squadron and the Light-Cruiser Squadron. Exercises recently also took place off the coast of Spain, in which detachments of the First and Second Battle Squadrons and the Third Battle Squadron, the First Battle-Cruiser Squadron and the Second Cruiser Squadron were engaged. It has been decided to substitute this year a test mobilisation of the Third Fleet for the grand manœuvres. The whole of the Royal Fleet Reserve are to be called out for eleven days, and 10,170 men and 14,000 Marines will be required. Those reservists who respond will not require to come up for next year's training, and are to receive a bounty of £1 in addition to their usual pay. All the ordinary naval manœuvres and exercises will take place as usual.

The special services of the Fleet during the year are worthy of note in this connection. Part of the Third Battle Squadron remained

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in the Mediterranean until the early summer of last year, the vice-admiral commanding (Sir Cecil Burney, K.C.B., K.C.M.G.) taking part in the blockade of Montenegro by the International Squadron, and subsequently as senior officer of the International Force in occupation of Scutari. Sir C. Burney remained temporarily as second in command of the Mediterranean Fleet until he left Scutari in October.

Last summer there were resumed some of the naval precautions on the China station which were in force during the revolution. The West River is patrolled by torpedo-boats to check piracy; but otherwise the dispositions on this station are normal.

Mexican ports have been repeatedly visited by H.M. ships in connection with the trouble in the republic. In December, the Rear-Admiral commanding the Fourth Cruiser Squadron was present at Tampico during a critical period of hostilities. H.M.S. Hermione remained after the squadron had left. H.M.S. Lancaster proceeded to British Honduras in January to assist in the maintenance of public order. Bluejackets and Marines were landed until order had been effectively established. There has been continued arms-traffic blockade in the Persian Gulf, and in operations on the Tangistan coast one man was killed and several wounded.

New construction.

Turning now to constructional work, it may be claimed that the most gratifying feature of the year is the fact that the Board of Admiralty had to present Supplementary Estimates to Parliament, amounting to £2,500,000 sterling, largely because greater progress than had been anticipated was made with the constructional programme. This brings the total expenditure on the Navy for all purposes to £48,109,300. Of the total Supplementary Votes, £558,000 were required for propelling machinery, £668,000 for armour, £50,000 for gun-mountings, £270,000 for projectiles and ammunition, and £60,000 for torpedoes; but it is not without significance that the work done on the hulls of contract ships is less than was expected to the extent of £207,000. There is thus ground for the view that shipbuilding is still in arrears, and to this fuller reference will be made when we come to review the progress of ships in course of construction.

The time was when the producing capacity of the country was measured by the rate of output of gun-mountings; but this is no longer the case, largely because the manufacturers of such machinery, at large capital cost, greatly augmented their machine-tool equipment and the number of their deep pits in which the mountings, from the magazine to the breech of the gun, can be erected for transfer to the ship. The warship building output is now determined rather by the

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possibility of making the armour for such ships in sufficient quantities. It should be remembered that, whereas a few years ago ships of the line were only 500 ft. long, now they are in some cases 600 ft. long. The freeboard, too, has been increased. The thickness of the armour has also been augmented. Thus not only has a greater area to be covered, but more steel is required owing to the greater thickness. As a result, the amount of armour for each ship has increased from about 4500 to over 6000 tons. The newer processes of treatment, whereby 10 to 15 per cent. has been added to resistance to penetration by projectiles, involves longer time and more expert knowledge and care. Two years ago one of our great armour-making firms added greatly to their plant, especially in respect of heat treatment furnaces; another is now completing similar additions. Each extension involved a capital expenditure of nearly £500,000, and an additional £500,000 is being spent on new machine tools for armour. And yet it is doubtful if the annual output of the country is now more than 65,000 tons. No other country in the world can equal this.

Armour manu-facture.

It will be recognised that the risks in armour manufacture are great; that is why no new firm has entered upon armour-making for many years. While the Admiralty are prepared to offer encouragement they cannot guarantee full or continuous employment. Each firm to-day has its own system alike as regards metal constituents and treatment; the principles which might be termed generic to the process, formerly applied to all, are now left behind. The plant is most expensive alike in first cost and upkeep, and there is no surety as to when it will be rendered obsolete owing to new invention or discovery. It may, too, be rendered partly idle by reduction in the demand at any time. Thus the cost of each ton produced must have debited against it, not only the actual cost, but a large percentage for depreciation and upkeep, and—what is more important in the national interest—the charges incurred for experimental research to ensure that our Navy shall ever have the best armour known to metallurgists. It is almost as difficult to compare cost of armour as to define the value of a work of art. The cost of almost every plate differs because its thickness involves differences in the process and because the finished form requires special mechanical treatment. Comparisons are therefore difficult. What is important is that the Admiralty specification of standard tests—carefully guarded as an official secret—is regarded throughout the world as ideal in the assurance it gives of sound results. Makers have loyally guarded the secret, even against their own foreign clients.

Rate of con-struction.

Notwithstanding the augmentation in two years of about 10 per cent. to the producing capacity in respect of armour, it is being

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more and more recognised that two years is an inadequate allowance for the building of the present-day ship of the line. It can be said that in not a single ship now in course of construction has the progress throughout been such as to justify two years as the standard time, even in Royal Dockyards. During the financial year ending with March there were completed and commissioned four battleships and one battle-cruiser, and the time which transpired between the laying down of the keels and the commissioning of each of the vessels is tabulated:—

BATTLESHIPS AND BATTLE-CRUISERS COMMISSIONED, 1913–14.

Type and Name of Ship.	Where Built.	Keel laid.	Date of Commission.	Time occupied.	
				Years.	Months.
Battleships—					
Centurion . .	Devonport Dockyard	Jan. 16, 1911	May 22, 1913	2	4
Ajax . . .	Scotts', Greenock .	Feb. 27, 1911	March 1, 1913	2	–
Audacious. .	Cammell Laird .	March 23, 1911	Oct. 21, 1913	2	7
Iron Duke .	Portsmouth Dockyard	Jan. 15, 1915	March 10, 1914	2	2
Battle-cruiser—					
Queen Mary .	Palmer's, Jarrow .	March 6, 1911	Sept. 4, 1913	2	6

Battle-ships and battle-cruisers.

The five capital ships commissioned in 1913–14—those given in the table, to which there must be added the Australia for the Commonwealth Navy—compare with seven in the previous year (including the New Zealand), four in 1911–12, and two in 1910–11. It will be seen that the average time taken in the building of the battleships in the table is two years three months, being the same as in the case of the four ships in the previous year, when the Conqueror was unduly delayed owing to changes in her gun-mountings.

1910-1911 programme. The King Georges.

In the programme of 1910–11 four battleships and one battle-cruiser were included: the King George V. was commissioned in November, 1912, and the four other ships are included in the vessels commissioned during the past financial year, which are named in the table already given—the battleships Centurion, Ajax, and Audacious and the battle-cruiser Queen Mary. The performances on trial of these vessels, along with the other capital ships tried during the financial year, were given in *Engineering* (see table on opposite page).

The three vessels Centurion, Ajax, and Audacious belong to the King George V. class, being 555 ft. long and of 23,000 tons displacement, and were required to develop 28,000 S.H.P. during an eight hours' trial. The average of all four ships, without the machinery being pressed to its fullest extent, was 28,225 S.H.P. Each ship proved capable of steaming 22 knots at full power, as

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compared with the legend speed of 21 knots. The speed at about 19,000 S.H.P. was about 19 knots. The Iron Duke and Marlborough belong to the programme of the subsequent year, 1911–12, and as the displacement has been increased to 25,000 tons, 1000 more S.H.P. was provided for to ensure the same speed as in the case of the earlier vessels. The Iron Dukes are 25 ft. longer than the King Georges, and the speed of 22 knots was realised for 1·2 horse-power per ton of displacement as compared with 1·23 horse-power. The battle-cruiser Queen Mary when developing 78,700 S.H.P. had a speed of 28 knots, while at three-fourths power the rate was 25 knots. The Australia is of the Indefatigable class. She exceeded 26 knots at full power, and her performance generally

RESULTS OF TRIALS OF CAPITAL SHIPS IN 1913–14.

Type and Name.	Builders.	Engineers.	Thirty Hours' Trial. S.H.P.	Thirty Hours' Trial. Coal per S.H.P. per hour.	Full-Power Trial. S.H.P.	Full-Power Trial. Coal per S.H.P. per hour.
Battleships—						
Centurion . . .	Devonport	Hawthorn, Leslie	19,500	1·8 lb.	28,200	..
Ajax	Scotts'Co., Greenock	Scotts' Co. .	19,500	1·7 ,,	28,000	1·7 lb.
Audacious . . .	Cammell Laird	Cammell Laird	20,100	1·7 ,,	28,700	1·5 ,,
Iron Duke . . .	Portsmouth	Cammell Laird	20,500	1·8 ,,	30,000	1·6 ,,
Marlborough . .	Devonport	Hawthorn, Leslie	20,800	1·8 ,,	31,000	1·8 ,,
Battle-cruisers—						
Queen Mary . . .	Palmer's Co.	John Brown & Co.	57,400	1·7 ,,	78,700	1·6 ,,
Australia	J. Brown & Co.	John Brown & Co.	32,000	1·5 ,,	48,000	1·5 ,,

was satisfactory. It will be noted that the fuel consumption of these large armoured ships averages about 1·6 lb. of coal per S.H.P. per hour for all purposes, which must be pronounced a very good result, especially under the conditions applicable to warship propulsion.

Engineering, commenting on the results, said that different propellers were designed by the Admiralty for each vessel of a class, the variations being in area and pitch as well as in diameter. This is a commendable course, as only by this means and the analysis of data got from trials and steaming in commission can a decision be arrived at as to the most efficient screw propeller for

Propellers and rudders.

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each type or vessel. In the case of the Ajax the Admiralty tried a four-bladed propeller, in order to increase the area to a greater extent than would have been possible with three blades; but the results were not so good as with the three-bladed propellers in sister-ships. Broadly speaking, a coarsening of the pitch seems to have conferred advantage. Of course, the type of propellers found best upon prolonged trial in any ship of a type is, as soon as is convenient, applied to all the ships of a class. Another point which has aroused considerable interest recently is the effect of having two wing rudders instead of one central rudder in these larger ships. One rudder, it was considered, could not be made within reasonable limits of size to have sufficient area to give a turning circle of low radius, and the desire to have a centrally-placed torpedo-tube in the stern of the ship, with its firing gear behind it, made the fitting of two wing rudders more or less a necessity. So far as the turning circle is concerned, this arrangement has proved specially satisfactory when the vessel is steaming at low speeds; but it is doubtful if it gives the best results when the vessel is travelling at high speed. Moreover, there is a suspicion that it has affected the efficiency of the propellers. Now that the stern torpedo-tube is being dispensed with, the centrally-placed rudder is being reverted to, not only in British but in some foreign ships, and another rudder, further forward in the same longitudinal line, is being fitted, the deadwood being cut away between the inner propellers. This is a reversion to a system adopted in four "ramming" Fleet cruisers of the Gladiator class, built in 1896, where the length of the hull was minimised, and a turning circle of small radius desired.

1911-1912 programme. The Iron Dukes.

Besides the Iron Duke and the Marlborough there were included in the battleship programme of 1911–12 two others of the same class, of which particulars were given in the previous issue of the *Naval Annual*. One of these two contract ships was the Delhi, subsequently renamed Emperor of India, laid down by Messrs. Vickers, Ltd., at Barrow-in-Furness, on May 31, 1912, and launched on November 27, 1913. The other was the Benbow, the construction of which was begun at Messrs. W. Beardmore & Company's works at Dalmuir on May 30, 1912, and she was launched on November 12, 1913. The difficulty of getting material owing to labour disputes has involved delay in the building of these vessels, and it is probable that they will not be commissioned until the autumn.

Tiger.

The fifth capital ship of the 1911–12 programme is the battle-cruiser Tiger, the first keel plate of which was laid down at Messrs. John Brown & Company's works, at Clydebank, on June 20, 1912, and the vessel was launched on December 15, 1913. If the builders

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succeed in completing this vessel before the end of this year they will have done good work. It is now possible to supplement the meagre information regarding this vessel given in the last issue of the *Naval Annual.* She is of the Queen Mary class. The length is the same, 660 ft. between perpendiculars, but she is of 18 in. more beam, being 90 ft. 6 in., and at 28 ft. 3 in. draught she will displace about 28,000 tons, or 1000 tons more than the Queen Mary. This is accounted for largely by armament, for although the primary guns are the same, namely, eight of 13·5 in. calibre in twin-gun turrets—two forward and two aft—the torpedo-repelling armament comprises twelve guns of 6 in. instead of sixteen of 4 in. calibre. There has also been an increase in the armour protection. The Tiger is to have Brown-Curtis turbines, which are of the impulse type, and the four shafts will be operated in pairs as usual. In view of the increase in displacement, the power of the machinery has been augmented, but the designed speed corresponds to that of the Lion, Princess Royal, and Queen Mary—28 knots.

1912-1913 programme. The Queen Elizabeths.

Of the five battleships of the 1912–13 programme only two have been launched—the Queen Elizabeth, which was laid down on October 21, 1912, at Portsmouth Dockyard, and floated on October 16th last, and the Warspite, laid down on October 31, 1912, at Devonport Dockyard, and sent afloat on November 26th last. It is significant that both ships took practically a year to reach the launching stage, notwithstanding that it is the general aim in the Royal Dockyards to minimise the time each ship occupies the building slip. As a consequence of the greater time these ships were on the slips, the vessels of the succeeding year's programme, 1913–14, have not been laid down as early as was anticipated. The machinery for these two ships—constructed respectively by the Wallsend Slipway and Engineering Company, Ltd., and Messrs. Hawthorn, Leslie and Co., Ltd.—has been well advanced, because the engineering firms have not had the same difficulty in making progress with their work as the contractors for the hulls. It remains to be seen, however, whether even the Dockyards will be able to deliver these great ships in two years and three months from the laying down of the keel. The other two ships of the class are the Valiant, laid down on January 31, 1913, at the works of the Fairfield Shipbuilding and Engineering Company, Ltd., and the Barham, begun on February 24, 1913, at the yard of Messrs. John Brown and Co., Ltd. The former is likely to be launched in July and the latter in the autumn. Nor has the Malaya, of the same class, been launched. She is the vessel to be presented to the nation by the Council of the Federated Malay States, and is being built by Messrs. Armstrong, Whitworth and Co.,

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while the machinery is being constructed by the Wallsend Slipway and Engineering Company, Ltd. It was hoped that three ships of the same class would be built under the Canadian Naval Aid Bill, and thus there would have been available in 1915 a fleet of eight ships of unique qualities. One of the battleships of the 1914–15 programme is to be of this class to give a squadron of six ships of the same tactical qualities.

These are the largest battleships yet built for our Navy, and interest has been intensified as the boilers have been constructed to use oil fuel only. This procedure was adopted to enable a speed of 25 knots to be realised with moderate dimensions without forfeiting any of the offensive and defensive qualities. The length of the five vessels is 600 ft. and the beam 90 ft. 6 in. On a draught of 28 ft. 9 in. the displacement tonnage is 27,500 tons. These are the first ships to carry 15-in. guns, and in addition they will have twelve 6-in. guns. The principal parts of the ship will be protected by 13-in. armour. The trials of the first of the 15-in. guns show that, as compared with the 13·5-in. weapon, there is an increase of over 30 per cent. in energy and of 50 per cent. in the effect the explosive charge may produce within the ship whose armour is penetrated. Other nations have adopted the 15-in. gun, but, to quote Mr. Churchill, owing to the trust which the Admiralty were able to place in our artillery science, it was not necessary to make a test gun, involving delay, and therefore we shall have ten ships armed with this weapon by the time any other naval Power has two.

Proposed limitations in size of ships.

Subsequent battleships—those of the 1913–14 programme—are smaller, because they are to be of 21½-knots instead of 25-knots speed; but this is to meet strategical and tactical conditions, and not by any means primarily to reduce displacement tonnage. The requirements of those responsible for our system of naval tactics are paramount considerations in design, but it remains the duty of the naval designer to fulfil those requirements on the minimum dimensions and cost. That is the first principle of all efficient engineering. On the other hand, those who contend for some international understanding as to a standard maximum of displacement tonnage, which all nations should agree not to exceed, might defeat the end economists have in view. Size and cost are not synonymous terms; they may vary in inverse ratio. Were the displacement tonnage of ships fixed, the aim of the designer would be to increase the fighting efficiency without involving additional weight; in other words, he would adopt superior and lighter metals the better to resist higher stresses than is possible with the baser or heavier metals now used. Cost would thus increase at a greater rate than to-day. The resources of the metallurgists

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have been utilised in the past to enable higher fighting power to be achieved while moderating increase in dimensions; but the pace would be quickened by limiting dimensions without restricting the ambition of each nation to excel with each ship over possible opposing ships.

The five battleships of the 1913–14 programme are, as we have said, smaller than the Queen Elizabeths. The ships of the new Royal Sovereign class have the same length as the Iron Dukes, slightly less beam, but greater draught under normal load, the displacement being 25,750 tons. In armament and armour protection they resemble the Queen Elizabeths; but the machinery is designed for the same speed as all the other preceding ships, and thus there has been no need to discard coal as fuel, although oil can be used at will along with, or alternatively to, coal.

1912-1913 programme. The Royal Sovereigns.

This year, for the first time, the contract ships of the programme have been laid down earlier than those entrusted to the Dockyard to build. Thus the Portsmouth ship, the Royal Sovereign, and the Devonport ship, the Royal Oak, were not laid down until January 15, 1914, while the Ramillies was begun at Beardmore's Works on November 12, 1913, being the day the Benbow was launched, the same berth being used for the new ship. The Resolution was laid down at Messrs. Palmer's Works, at Jarrow-on-Tyne, on November 29, 1913, and the Revenge at Messrs. Vickers' at Barrow-in-Furness, on December 22, 1913. In former years, contract ships were not laid down until March, April, or even May. This acceleration is due to the postponement of the Canadian Naval Aid Bill, and is intended to ensure that our position two years hence will not be jeopardised by the absence of the three Canadian ships which it was at one time hoped would be ready by that time. The acceleration involved a Supplementary Estimate amounting to £437,000 for greater progress than had been anticipated. But this provision was not considered adequate in view of the strong representations made to the Canadian Government as to the probable deficiency in our battleship strength relative to that of Germany in 1916.

For the same reason, two of the four battleships included in the programme of 1914–15 are to be laid down at an early date. For each of these over £350,000 is provided in the Estimates of the current year, and of this sum £174,000 is for the hull and armour, £80,000 for the propelling machinery, and £85,500 for the gun-mountings; and the Admiralty have already under consideration tenders from nine firms for the building of these two ships, which are thus likely to be laid down in July. These vessels are to resemble the Royal Sovereigns. The Portsmouth ship will also be of this design, and on her £132,090 will be spent, while the Devonport

1914-1915 programme.

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ship will be a Queen Elizabeth, and for progress on this unit £115,899 is allocated.

The other new vessels included in the 1914–15 programme are four light armoured cruisers, twelve destroyers and a number, not stated, of submarine vessels. The total cost of the new programme is estimated at £14,817,000, as compared with £18,824,700 for the new ships in the 1913–14 programme. As a consequence there is a reduction in the expenditure involved in the completion of all ships authorised by Parliament of £3,556,000, the amount being £40,886,000, including the cost of this year's new ships. This is the first time for five years that there has been a reduction in this sum, representing "the liability of commitments." But economy under this head is justified only if the provisions made to meet the needs of naval supremacy are completely adequate. This subject is dealt with in Chapter III., on the Comparative Strength of Navies. On the new ships to be laid down £1,950,000 is to be spent during the current year, and the total expenditure under Votes 8 and 9 to advance all ships in course of construction is £18,373,000 as compared with £17,360,000 earned during the past year. This increase of £1,000,000 sterling for new construction is due to the view that as pressure in the shipyard and engineering works throughout the kingdom is being lessened, greater progress is probable and that an exceptional number of ships will be completed.

Light armoured cruisers.

With the building of light cruisers only moderate progress has been made during the year. The three "Town" cruisers of the 1911–12 programme have been completed—the Birmingham, Lowestoft, and Nottingham—and have been commissioned. The last of the Australian ships of this class to be built in Britain—the Sydney—has also been completed. These vessels were fully described in the preceding issue of the *Naval Annual*, and the results of the trials are given in the appended table, taken from *Engineering*:—

RESULTS OF TRIALS OF LIGHT ARMOURED CRUISERS.

Name.	Builders.	Engineers.	Eight Hours' Trial.		Full-Power Trial.	
			S.H.P.	Coal per S.H.P. per hour.	S.H.P.	Coal per S.H.P. per hour.
				lb.		lb.
Birmingham	Armstrong	Hawthorn, Leslie	22,800	1·8	26,500	1·7
Nottingham	Pembroke	Hawthorn, Leslie	22,800	1·8	26,300	1·8
Lowestoft	Chatham	Fairfield	22,800	1·8	26,200	1·8
Sydney	London & Glasgow Co.	London & Glasgow Co.	22,400	1·6	25,500	1·4
Fearless	Pembroke	Beardmore	15,100	..	18,900	1·6
Amphion	Pembroke	Parsons	15,200	1·9	18,800	1·7

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The Fearless and Amphion are the last of a series of 26-knot vessels which are weak in armament and have not been kindly received, and no more need be said of them. The Fearless was also commissioned, making, with the Sydney, five such cruisers added to the Fleet.

The 1912–13 programme brought a new class. Eight were ordered under the programme and eight more in 1913–14. The complete list is as follows, those of the earlier programme being named first:—

Arethusa	Chatham and Fairfield Co.
Aurora	Devonport and Parsons Co.
Galatea, Inconstant and Royalist	William Beardmore and Co.
Penelope and Phaeton . . .	Vickers, Ltd.
Undaunted	Fairfield Co.
Cordelia and Carysfort . . .	Pembroke and Hawthorn, Leslie & Co.
Calliope	Chatham and Parsons Co.
Conquest	Chatham and Scotts' Co.
Cleopatra	Devonport and Cammell Laird & Co.
Caroline	Cammell Laird & Co.
Champion	Hawthorn, Leslie & Co.
Comus	Swan, Hunter & Wigham Richardson and Wallsend Engineering Co.

The earlier vessels have a length of 410 ft. and a beam of 39 ft., while at 13½ ft. draught they displace about 3750 tons. The eight of the C class ordered for the 1913–14 programme have a slightly greater length and tonnage. The speed anticipated is about 29 knots. All are protected by side armour extending right fore and aft and of very considerable depth. The thickness for the greater part of the length is 3 in., reduced slightly at the fore and aft ends. The armament is reasonable for the size of the vessels. They mount two 6-in. and eight 4-in. guns, with two twin torpedo-tubes for discharging the largest and most powerful torpedoes now made. The great improvement in the fighting efficiency of these light armoured cruisers is, in large measure, due to the advance in the efficiency of the propelling machinery.

The two Dockyard ships first named were laid down in October, 1912, and the Aurora was launched on September 30th following, while the Arethusa, which was built in a graving dock at Chatham, was floated out a few days later. The six other contract ships of the same programme were laid down in December, 1912, and January, 1913, and the Undaunted has been launched. It will be noted that five of the cruisers of the 1913–14 programme were allotted to the Dockyards. This is a much larger amount of light work than has been entrusted to the Dockyards for many years. The explanation is the pressure of work experienced at the time in the establishments of firms capable of undertaking these vessels. The date of laying down the vessels has varied. Thus the Cordelia was begun on

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July 21, 1913, and she was launched on February 23rd. Soon afterwards the Carysfort was begun in the vacated berth. The Comus was laid down on November 3, 1913, the Calliope on January 1, 1914, the Caroline on January 28th, the Champion about the middle of February, the Cleopatra on February 25th, and the Conquest on March 3, 1914. About a dozen of these vessels ought to be in commission before the end of this year.

In the programme of 1914–15 four more vessels of this class are included, one of which will be laid down at Pembroke Dockyard, and on it £72,961 will be spent this year; but the other three, to be built by contract, will not be laid down until well on in the financial year. In view of the work being done by some other Powers in the building of this type of vessel, the number included in this year's programme and the provision made for progress with them must be considered inadequate.

Destroyers.

During the year twenty destroyers were commissioned, as compared with fifteen in the previous year. Apart from the activity in new construction, the most prominent feature of the year was the new classing of all the vessels of the type in the Navy. The idea is to enable anyone to identify the class and age of any vessel from the name borne. All destroyers—past, present, and future—are now specially grouped in classes styled A, B, and so on through the alphabet, the oldest vessel being classed A. Each vessel has now her class letter painted in large size on her foremost funnel. The letters up to K were absorbed by existing vessels. The twenty destroyers laid down under the 1912–13 programme, and originally given a variety of names, principally of characters in Scott's romances and Shakespeare's plays, have been re-named, and they all begin with L—the class letter. Those building under the 1913–14 programme have names with the initial letter M. An Admiralty Committee have drawn up a full list of suitable names, and the intention is to commemorate distinguished naval officers. Where an explanation of the name is considered necessary it will be given on a brass plate on board the destroyer, and where officers' names are given, a short account of the career of the officer will be given. This is quite a commendable feature of the scheme.

All the vessels of the 1912–13 programme have been launched, their construction having been begun at a much earlier period of the year than usual. The accompanying table gives a list of the vessels tried in 1913, with the speed realised, the vessels beginning with L being those of the 1912–13 programme, and in their case the original names are given in brackets. The other vessels with names having

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various initial letters belong to the K class of the programme of 1911–12.

TRIALS OF OCEAN-GOING DESTROYERS IN 1913.

Name of Vessel.	Builders of Vessel and Makers of Machinery.	Speed on Full-Power Trial.
		knots.
Laertes (Sarpedon)	Swan, Hunter & Wigham Richardson; Machinery Wallsend Co.	31·2
Lysander (Ulysses)	Swan, Hunter & Wigham Richardson; Machinery Wallsend Co.	29·9
Lynx	London & Glasgow Co., Ltd.	31·9
Lark (Haughty	Yarrow & Co.	29·5
Linnet (Havoc)	Yarrow & Co.	29·8
La Forey (Florizel)	Fairfield	29·9
Achates	John Brown & Co.	32·3
Ambuscade	John Brown & Co.	30·4
Cockatrice	Hawthorn, Leslie & Co.	30·9
Contest	Hawthorn, Leslie & Co.	29·7
Shark	Swan, Hunter & Wigham Richardson; Machinery Wallsend Co.	31·4
Sparrowhawk	Swan, Hunter & Wigham Richardson; Machinery Wallsend Co.	30·7
Spitfire	Swan, Hunter & Wigham Richardson; Machinery Wallsend Co.	30·3
Midge	London & Glasgow Co., Ltd.	32·9
Hardy	J. I. Thornycroft & Co., Ltd.	31·9
Paragon	J. I. Thornycroft & Co., Ltd.	30·6
Porpoise	J. I. Thornycroft & Co., Ltd.	30·8
Garland	Cammell Laird & Co.; Machinery by Parsons Co.	30·4
Fortune	Fairfield Co., Ltd.	30·7
Arcent	W. Denny and Brothers; Machinery by Denny and Co.	29·5

Most of the vessels are of the Achates class, having a length of 260 ft., a displacement of about 940 tons, and mounting three 4-in. guns and two torpedo-tubes. The designed power was 24,500 S.H.P., and the legend speed 29 knots; but on trial this was exceeded, the speeds ranging from 29½ to over 30 knots. One or two of the vessels were of special design, and the speeds ranged up to nearly 33 knots. Weather conditions affected the results, but in every instance the vessel proved capable of maintaining 30 knots at sea under unfavourable weather conditions. It should be remembered that in the design of British destroyers special regard is given to the attainment of high speed in heavy seas, and thus, in comparison with vessels of the same class in foreign navies, the true test would not be so much fair weather steaming as the rate possible with a North Sea gale blowing. The vessels of the L class are nearly all built to Admiralty design, and differ only from the K class in their increased turbine power and speed; they are designed for 31 knots. Several of the M class just laid down are to steam over 33 knots, and higher rates will no doubt be provided for in the

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near future. In all cases they will be powerfully-built vessels, in order to achieve high speed in heavy weather. These more powerful vessels of the 1913-14 programme—the M class—were ordered as follows :—

Miranda, Minos, Manly	Yarrow and Co.
Mentor, Mansfield	Hawthorn, Leslie and Co.
Meteor, Mastiff	Thornycroft and Co.
Milne, Moorsom, Morris	John Brown and Co.
Murray, Myngs	Palmer's Co. and Parsons Co.
Matchless	Swan, Hunter and Wigham Richardson and Wallsend Engineering Co.

The seven vessels first named were laid down at various dates from May to July and the others in November, December and January. In addition, two destroyers of special type have since been ordered to act as flagships to the L and M flotillas, one—the Lightfoot—to be built to Messrs. J. S. White and Co., Ltd., Cowes, and the other—the Marksman—by Messrs. Hawthorn, Leslie and Co., Ltd., Newcastle. In the 1914–15 programme twelve destroyers (N) are provided for, and the sum allotted for progress with them is £314,612. Some of them will be of approximately the same design as the M class, and these will be commenced at an early date.

Sub-marines. In the case of submarines nine have been commissioned during the year, including the two Australian vessels, and eleven have been ordered. These latter are of various designs, and range up to vessels of very considerable size; but here, as with the latest design of torpedo-boat destroyers, it is not desirable to enter into details. Of the eleven vessels ordered, one—of the coastal type—is to be built at the Chatham Dockyard, two of the E class by Messrs. Vickers, who have also received orders for three others to be known as V's, while the three additional boats by the Scotts' Shipbuilding and Engineering Company are S's, and Messrs. Armstrong, Whitworth and Co.'s two vessels W's; each firm thus gives an initial letter of their title to the class. The S's will be generally of the Laurenti type, the Greenock firm having launched the first of their submarine vessels of the class on February 28th, while the Elswick vessels will be of the Lebœuf type. Two of the vessels are of special type—the Nautilus, to be built by Messrs. Vickers, and the Swordfish, by Scotts' Company. In the 1914–15 programme the provision made for progress with the vessels of this type is £1,150,000, as compared with £809,146 in the previous year. Of the former sum £308,000 is for new vessels to be laid down—one at Chatham and the others by contract—but the number to be commenced is not available.

In this connection reference may be made to the regretted loss of submarine A7—the most disastrous naval accident of the year.

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This vessel, owing to some cause yet unexplained, sank off Plymouth on January 16th, and every effort to raise her proved unsuccessful, largely because the stern had bored its way into the bottom of the sea. Ultimately the idea of salving the vessel was abandoned, and on March 12th the burial service was read over the spot where the vessel was sunk. The Admiralty were at the time of the loss severely criticised, and it was urged that the A class had become obsolete and ought no longer to be sent to sea, but the First Lord of the Admiralty, in the House of Commons on February 12th, stated that for two years all important questions connected with the practical use of British submarines have been referred to an Advisory Committee of submarine officers, who are constantly serving in and using these vessels. He assured Parliament that there was no reason to suppose that the A class submarines are not safe and efficient vessels for the purposes on which they are now employed, or that service in them, within their proper radius of action, is more dangerous than service in the larger and later classes of submarines, which are constantly operating alone, far out at sea in deep water, against swiftly manœuvring squadrons. In addition to innumerable diving exercises, 1350 attacks were delivered by A boats between January, 1912, and January, 1913, alone. No submarine accident of any kind had occurred to an A boat since 1905, except the loss of A 3, which was due to a collision, and not to any defect. During the past three years only nine officers and thirty-seven men were lost in all our submarine accidents—mostly owing to collisions—and notwithstanding the great risks involved.

A later chapter is devoted exclusively to the aerial fleet, and their guns are dealt with in the chapter on armaments, but some general notes on the subject may suitably be made in this place. Great advances have been made by the Air Department, which is under Captain Murray F. Sueter, C.B., and £250,000 of the Supplementary Navy Vote, passed by the House of Commons on March 3rd, was for this branch of the Service. During the year the Admiralty have taken over all the Army airships, and in future will be responsible for the care, maintenance, and working of lighter-than-air craft. Every endeavour has been made to encourage the airship building industry, and Messrs. Vickers and Messrs. Armstrong, Whitworth & Co., Ltd., having acquired the rights of the most promising continental designs for non-rigid ships, are establishing departments for airship construction. There are now in the possession of the Naval Airship Section seven airships, one Willows, one Astra-Torres, a Parseval, and the four formerly known as Beta, Gamma, Delta, and Eta, constructed by the Royal Air Factory. During the year eight Naval airships.

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ships were ordered, which will cost £475,000. Of the fifteen built and building, ten are large or medium sized ships with a speed of 45 miles per hour, with a radius of action of 48 hours. Messrs. Vickers are building at Barrow-in-Furness one large rigid Zeppelin type and three non-rigid Parseval-type airships. Messrs. Armstrong, Whitworth & Co. have received an order for three large semi-rigid airships of the Forlanini type, the first to be constructed in Italy and the others in this country. One non-rigid ship is to be built by the Astra Company. Large sheds have been built by Messrs. Vickers and Messrs. Armstrong.

Aeroplanes and seaplanes.

Of seaplanes and aeroplanes there are now in the possession ot the Admiralty 103, of which sixty-two are seaplanes. Air stations have been established at various points on the coast, and much work has been done in conjunction with the patrol flotillas. Considerable experience was gained during the manœuvres in the flight of seaplanes from ships, and as a result a special fleet auxiliary is to be added to the Navy for carrying seaplanes, and with facilities for flights being made from her decks. The men at the seaplane stations—of which there are seven—have taken over the Coastguard duties in their vicinity, and occupy the Coastguard buildings. It is still the policy of the Admiralty to test all promising types of machines, as it is not yet possible to settle on any one type for sea service, since improvements are being effected almost daily. Arrangements have been made for the admission of civilians to this branch of the Service, and training in aeroplane and in airship work will be concentrated at the Eastchurch schools, whence the airship training department, now at Farnborough, will shortly be transferred.

Fleet auxiliaries.

As regards auxiliary ships for the Fleet, the most important in course of construction, in addition to the seaplane ship, are those for carrying oil in bulk to the fleet. Fifteen of these are being, or have been, constructed at a cost of £1,400,000, and many are to be propelled by various types of internal-combustion engines, so that experience may be acquired regarding the working of such machinery in service. A Coastguard cruiser, named Safeguard, has been ordered from Messrs. Day, Summers & Co., Southampton. Proposals and prices were received at the Admiralty for a floating workshop to be stationed at the Cromarty base; but no decision has been arrived at regarding the construction of this interesting auxiliary to the Fleet.

Naval works.

The work at the various bases, as described in the last issue of the *Naval Annual*, continues to progress. The Rosyth docks are progressing satisfactorily. Both of the two locks at Portsmouth Dockyard for the largest of ships have been completed and are in

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use. A great scheme at Cromarty is evidently contemplated, as 87 acres of land have been acquired. Defence works have been completed, and Commander D. J. Munro, retired, has been appointed King's Harbour Master. At the airship station at Kingsrorth, on the Medway, there is being built a shed 550 ft. long, 100 ft. high, and wide enough for two large airships. The doors weigh 100 tons each. Near by Messrs. Vickers are also building a shed in addition to those at Barrow-in-Furness; this shed is 540 ft. long. At the naval seaplane station in the Isle of Grain there are nearly a dozen hangars, and similar establishments are likely to be undertaken soon, here and elsewhere.

Accelerated retirement of officers.

Great changes are in progress in relation to the *personnel* of the Fleet. The most interesting development in connection with officers is in connection with the scheme for accelerating the retirement of senior and the promotion of younger officers. The former applies to all officers above the rank of Commander. Admirals, for instance, will retire three years after the date of their active service as Flag officer, provided they have been at least one year on the Admirals' list. The same applies to Vice-Admirals, with this addition, that, when promoted to the rank of Admiral, they will retire if they have not served as Vice-Admirals. In the case of Rear-Admirals the retirement is after the lapse of two and a half years since the date of their last service as Rear-Admirals or since their promotion to the rank of Rear-Admiral, or three years from the date of their last service as Captain, or on promotion to the rank of Vice-Admiral if they have not flown their flag at sea as Rear-Admirals. These arrangements have the advantage that they ensure that all Vice-Admirals must have taken command at sea. The period of non-service leading to compulsory retirement in the case of Captains is two years since their last service as Captain, or three years if they have not served as Captain, and in the case of Commanders two years after their last service. The time reckoned in determining the period for retirement will not include any period when an officer occupies a position definitely assigned to one of lower rank; but Rear-Admiral appointments to the Dockyards, cruiser squadrons, battle squadrons, the Home fleet at Home ports, patrols, and such others, will be reckoned in this connection. The Captains whom the Board may decide not to employ as Flag officers will be retired on promotion to Rear-Admiral and will receive the pension of a Rear-Admiral. A new rank has been instituted—that of Lieutenant-Commander—to be held by a Lieutenant of eight years' seniority; and the title of Lieutenant-Commander will cease to be applied to a Lieutenant who does not hold the

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rank; he will be described as Lieutenant-in-command, which, it must be confessed, is somewhat clumsy. These new regulations, which have just been brought into force, will undoubtedly increase the incentive to eligible lads to enter the Service. Such incentive, if not necessary, is at least very desirable, in view of the increasing number of officers required for the Service.

Entry of cadets from public schools.

Obviously, with the view further of making up the threatened shortage in the number of officers, which was referred to in the last issue of the *Naval Annual*, arrangements have been made for cadets to enter from public schools at a later age than that of entrants under the ordinary system. Of these special cadets forty-two have been entered during the past financial year, and it is contemplated to enter sixty in 1914. The age of admission is between seventeen and a half and eighteen and a half years. On satisfying conditions analogous to those of the ordinary entry system, the candidates are examined by the Civil Service Commissioners, and if successful become cadets and undergo a course of training for a period of one and a half years. During this period they are accommodated on board a cruiser, part of the instruction being given on board and part on shore. On completing this course and passing out satisfactorily, they join the Fleet as midshipmen. They reach this stage later in age than cadets who go through Osborne, but their service in that rank will be shorter, with the general result that, except for the effect of the accelerated promotion which they may obtain by doing well in their final examinations, their age will usually be about a year more on attaining the rank of Lieutenant. This will be no bar to their advancement according to merit. The same subsequent career will be open to them as to officers who have entered the Navy through the usual channel. These special entry cadets, as they are officially called, also attend Keyham College and witness experiments. Their engineering training is under the supervision of the Engineer Captain in charge of the College.

Ordinary direct entry regulation changes.

Modifications have been made in the regulations for the entry of naval cadets, but the main feature of the scheme is still that all cadets are trained together until they pass the rank of Lieutenant, when they may complete their training to be general service officers, or to specialise in engineering, gunnery, torpedo, navigation, or marine duty. Entries now take place three times a year, in January, May and September, and the age of entry is now between thirteen years four months and thirteen years eight months. The examinations and standards continue the same; but a Medical Board of Health has been instituted to meet the cases in which the parent or guardian of the candidate is not satisfied with the result of the official medical

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examination. This "appeal" Board consists of the Director-General of the Medical Department of the Navy, a physician recommended by the Medical Consultative Board, and a specialist in the particular defect which caused the disqualification of the candidate. A further commendable change is that the general payment of £75 per annum may be reduced to £40 in the case of a certain number, not exceeding 25 per cent., of the entrants, where the pecuniary circumstances of the parents are such as to justify it. A proportion of those admitted at the less scale—up to 10 per cent. of the entrants—will be sons of officers in the Navy, Army or Marines, or of civil officers under the Board of Admiralty.

The specialised training of midshipmen.

Following upon the suggestive report of Admiral Sir Reginald Custance's Committee on the Education and Training of Cadets, Midshipmen and Junior Officers, certain alterations have been made, principally in the work done by junior officers in the training cruiser on which they serve as midshipmen for two years and four months. These changes are devised to add more than was possible formerly to the practical knowledge of seamanship, navigation, pilotage, gunnery, torpedo and engineering work. A further change, referred to in the First Lord's Memorandum, was made in regard to officers specialising in various branches. They are to undergo a preliminary course of theoretical instruction at the Royal Naval College, Greenwich, the better to prepare them for practical instruction at Portsmouth or Keyham. This preliminary training at Greenwich is a year's course for gunnery, torpedo, and engineering specialising officers, the two former having next an eight months' practical course at Portsmouth, with a subsequent advanced course of six months at Greenwich; while the engineers have a twelve months' practical course at Keyham Engineering College, with a two years' advanced course at Greenwich. For the reception of these officers the Keyham College was opened on April 1st, after having been closed for many years much to the regret of all interested in engineering in the Navy. The navigation officers will have two preliminary courses each year and two practical courses. Thus the "sandwich" system is applied in all cases. Before selection, too, the officers must have got their watch-keeping and engineering certificates, and gunnery and torpedo officers must have served at least a year at sea in charge of a watch, navigation officers not less than a year at sea after passing all examinations for the rank of lieutenant, and engineering officers two years at sea after passing lieutenancy examinations. The changes made would seem to ensure a higher degree of practical training for the specialising officers in the various branches of the Service.

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The cruisers Cumberland and Cornwall continue to be used for the training of cadets, and the former, during the past year, visited the West Indies in January–April, Canadian Atlantic waters in May–July, and the Mediterranean in December–April. The Cornwall has made shorter cruises—to Gibraltar, Madeira, Norway and the West Indies.

Promotion from the ranks.

There have been selected for promotion to commission 101 Mates since the scheme was organised three years ago. Most of these are qualifying in the earlier stages of training, and thirteen are pursuing their course afloat. Two Marines have been advanced to commissioned rank. This privilege of promotion from the ranks to a commission has been extended to artificer engineers and engine-room artificers. The first batch is to include ten; fifty are to be promoted before March, 1918. The captain and engineer officer first makes the selection of candidates who show "promise of the qualities required in a commissioned officer." Such candidates must have had four years' service as engine-room artificers (4th Class), and be not more than thirty-two years of age. In three years this upper age limit will be made thirty. The names of candidates recommended in each squadron or command are to be considered by a Committee of that squadron appointed by the Flag officer in command. The candidates selected by the Committee are required to take a qualifying examination afloat of a high standard in educational and engineering subjects. A final selection is made at the Admiralty from candidates who are successful at the examination. Those chosen are given the rank of Acting Mate (E) and proceed to the Royal Naval College, Greenwich, for a six months' course of instruction, followed by a course of the same duration in engineering at the Keyham Engineering College. Acting Mates (E) are to be classed as Ward-room officers and to receive a messing allowance of 2*s*. a day, in addition to the pay of 8*s*. per day, with a £25 gratuity for uniform. Examinations are to be held at the end of the Greenwich and Keyham courses and classes of certificates awarded. Acting Mates (E) who pass successfully will be confirmed in their rank and appointed to sea-going ships. While so serving they will be reported on periodically. They will receive a gratuity of £50 for uniform and outfit and will mess in the Ward-room. The time served as Mate (E) will depend on the result of the examinations at Greenwich and the Engineering College, together with the reports and recommendations from sea; the minimum period of service as Acting Mate (E) and Mate (E), before promotion to Engineer Lieutenant, will be two years. On promotion to Engineer Lieutenant, after serving the prescribed period afloat, these officers will be granted a further annuity of £50 for uniform and outfit, and will be subject in all

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respects to the regulations regarding officers of that rank. This latest incentive to the rank and file merits the detailed reference given to it here, as it shows that the right spirit is still maintained in connection with naval administration.

Personnel. The *personnel* for the current year is to be increased by 5000 to 151,000, and at the same time there is provided a considerable increase in the monthly rate of payment to seamen and marines, the average being now 43*s*. 5*d*., as compared with 30*s*. in 1906. Partly because of this and partly due to the allowance to officers and men of the reserve temporarily employed in the test mobilisation, the vote for wages has had to be increased by £400,800, while the victualling and clothing vote has been increased by £162,000. Of the total of 5000 added to the numbers 2232 are to be boys. Usually such boys enter for training as seamen and signalmen or in the wireless telegraph branch at fifteen and a quarter years of age, and it is now proposed that about 25 per cent. of boys should be advanced to men's rating at the age of seventeen and a half instead of eighteen years, as hitherto; but advancement in such cases will be dependent on the physique and capability of the boys. Additional facilities are to be provided for the training of such boys, and the cruiser Andromeda is to be employed, along with the Powerful, to constitute a separate training establishment under the Commodore of the Training Service. The preliminary sea-training squadron is now made up of eight ships of the Edgar class. At the same time, a Committee, presided over by Rear-Admiral the Hon. H. L. A. Hood, C.B., is considering the whole subject of the training of boys.

The Royal Marines. The number of Royal Marines borne at the end of March was about 16,900, in addition to 1450 bandsmen. There has been closer contact during the year between the Marines and the Army, some of the former acting with the Army troops during the naval manœuvres, and a battalion underwent a course of training at Aldershot last summer. Twenty-one officers were admitted by direct entry, and two non-commissioned officers have been passed to the Royal Naval College for a course of training preparatory to taking a commission. Major-Generals of the Royal Marine are to be appointed to Army commands in the future, and the first appointment has been made. Royal Marine officers are also being passed into the Royal Flying Corps. The total complement of the Coastguards remains as before —namely, 3030.

Coastguards and Reserves. The total strength of the Royal Fleet Reserve is now 27,762, an increase during the year of 1274. As already stated, about 25,000 of these have been invited for eleven days' training in the Fleet this summer. The Royal Naval Reserve now totals 17,519, including

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1250 officers of the military branch and 150 commissioned engineer officers. In addition to the courses of instruction and training for a shorter or longer period, special signalling instruction has been given at the principal mercantile ports. A wireless telegraph branch of the reserve is about to be instituted. The trawler section of the Reserve now numbers 992, and 693 underwent four to eight days' training during 1913. There is still a shortage in deck hands.

Naval Volunteers.

The Royal Naval Volunteer Reserve of six divisions (comprising forty-seven companies) had a total strength at the beginning of the year of 4417, the establishment being 4914. The largest station is on the Clyde, with a strength of 1243, the next in order being London, with 886, and the Mersey with 691, the others being the Tyneside, Sussex and Bristol. Included in the Clyde Division are the companies organised on the Forth, but these latter are to become a separate division with a drill ship. Of the total strength, 1579 officers and men embarked for fourteen or twenty-eight days' training with the First Fleet, and fifty-five volunteers qualified for training certificates in engine work and other skilled naval ratings. Thirty-nine officers and seventy-one petty officers and men pursued special courses of instruction, principally in gunnery and torpedo practice, during the year. Eight medical officers attended a fourteen days' course at Haslar Hospital; and there is a new rank—surgeon probationer.

The "world-defence of the Empire."

Canada.

The three ships provided for in the Canadian Navy Bill were to assist towards the constitution of a Battle Squadron in the Mediterranean towards the end of 1915. The Bill was rejected by the Upper House of the Legislature last year, and has not been re-introduced. Moreover, no serious effort is being made to provide the *personnel* of a Canadian Navy. It is true that eighteen cadets from Canada completed a year's training in the Berwick, and that a further batch of eleven cadets has now been embarked, while three Canadian Sub-Lieutenants are serving in the Fleet; but the number of men recruited is insignificant. There may be justification for a difference of opinion as to the manner of Canada's assistance in the defence of the Empire, but the present position is not creditable to this great Dominion.

The Australian Navy.

The commissioning of the battle-cruiser Australia and of the light cruiser Sydney, and the departure from this country in March of the two submarine boats built by Messrs. Vickers, completes the vessels being constructed in this country for the Australian Fleet. There remain to be completed one light cruiser, the Brisbane, and three destroyers being built at the Australian Government Dockyard at Cockatoo Island, Sydney. These are progressing slowly. The recruiting and training of the *personnel* for the Australian Navy is

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proceeding satisfactorily, and the Navy station has been handed over to the Commonwealth Government.

New Zealand.

The armoured cruiser New Zealand, which was built at the expense of the Dominion, and has been placed at the disposal of the Admiralty, completed a cruise which is unprecedented for extent. Between February and November last she compassed the world, visiting the principal ports of South Africa, Australia, New Zealand, the Fiji Islands, British Columbia, South America, and the West Indies. At a banquet to the officers of New Zealand on April 18th of last year, the Prime Minister said:—"Whatever policies the various Dominions adopted, all the ships must become Imperial ships, and pass under Imperial control as soon as the first shot was fired." In September, Mr. Massey said:—"New Zealand had not the slightest intention of going into partnership with Australia in naval defence." In the following month a substantial modification of naval policy was announced by the Prime Minister. During the spring the Dominion Minister of Defence, Colonel Allen, visited this country. Owing to Australia ceasing to be an Imperial naval station and being handed over to the Royal Australian Navy, a new situation had arisen. The Government of New Zealand offered to increase its subsidy to the Royal Navy from £100,000 to £150,000 a year if two "Town" class cruisers were stationed in New Zealand waters. This proposal was declined by the Admiralty on the ground that the cruisers were required elsewhere. In consequence, on October 28th, Mr. Massey announced the new naval policy of the Dominion:—

"It was proposed," he said, "to discontinue the present subsidy system, and to take up a greater responsibility. They had hoped that the Admiralty would be able to carry out the agreement of 1909, and station two cruisers of the Bristol class in New Zealand waters, the Dominion bearing the cost of their upkeep. The Admiralty, however, had stated that they were unable to do this, and had substituted the two existing light cruisers, Psyche and Pyramus. This was not satisfactory to them. The New Zealand Government had, however, accepted an offer of the Philomel as a training-ship, and if the Home Government were unable next year to provide a Bristol cruiser they (the New Zealand Government) proposed to recommend Parliament to order the building in England of a cruiser of the Bristol type at a cost of £400,000. In the meantime the Philomel would be taken over and a commencement made with the training of young men.

"It was proposed that any vessels that the Dominion might acquire should be under the administration of the Dominion in time of peace, while they should automatically pass under the direct

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control of the Admiralty in time of war, and should also be available for the Admiralty on any other occasion when they might be urgently needed.

"The British Dominions in the Pacific," Mr. Massey concluded, "aimed at nothing less than the same naval supremacy in these seas as was held by their kinsmen on the other side of the world."

Sir Joseph Ward in reply strongly maintained adherence to the policy of one Imperial Navy as the better and more economical course, but the proposals of the Government were approved. The portion of the old Australian station, not transferred to the Australian Navy, has been formed into a New Zealand Division. The Philomel, sent from the East Indies, and two small cruisers of the P class previously serving on the station will form the nucleus of the New Zealand Division and will be manned by the New Zealand force when trained. The New Zealand Government intends to build one or two cruisers of the "Town" class. The channel for the entry and training of cadets will be the Royal Australian Naval College, but, as before, two officers annually will enter through Osborne. For the men the period of engagement will be seven years, and during that time they will be liable for service in any ship of the Home Fleet. The annual appropriation from the revenues of the Dominion, amounting to £100,000, which is paid as a subsidy to the Admiralty, will be debited with the wages and upkeep of the New Zealand force, the remainder alone passing to the Admiralty. Any ship acquired by New Zealand will be under the administration of the New Zealand Government in times of peace, but will automatically pass under the direct control of the Admiralty on the outbreak of war or when urgently required. It is satisfactory to note that the principle of unity of control in time of war is adhered to.

The policy in the Pacific.

The question of the naval situation in the Pacific, which is referred to again in Chapter III., is naturally of supreme moment to Australasia. In August of last year the Governor-General of Australia sent the following telegram:—

"Government of Commonwealth of Australia are considering naval defence situation, especially arrangement come to at Imperial Conference in London, August 19, 1909, by which Australian Fleet unit will form part of Eastern Fleet of the Empire with similar units of the Royal Navy, to be known as China and East Indies units respectively. Completion of Australian Fleet unit as then agreed to is near at hand, but it does not appear to my Ministers that China and East Indies units are in course of being provided. Government of Commonwealth of Australia anxious to know exactly intentions of His Majesty's Government in this respect. If any new circumstances

have arisen which it is considered should necessitate an alteration in this agreement to provide units, my Ministers would be glad to be informed, and, if thought necessary, will arrange for representation at a conference, should His Majesty's Government consider such a course necessary. "(Signed) DENMAN."

After a further exchange of telegrams between the Home Government and those of Australia and New Zealand, it was found impossible to arrange for a Conference during 1914. A Conference on Imperial Defence, at which Canada and South Africa will also be represented, will probably be held in 1915.

The whole problem of Imperial Defence requires the earnest consideration of the Statesmen of the Mother Country and the Oversea Dominions. It is generally recognised that there is great need for bringing about a larger co-ordination in the efforts which are being made, and which may be made, in connection with the world defence of the Empire. Special circumstances have so far prevented Canada from playing her part; but it can hardly be doubted that she will do so ere long in a manner worthy of her wealth and importance. The natural wish of the Dominions to control the ships for which they pay, in some cases does conflict, and in others may conflict, with dominant strategical and tactical requirements. In small separately-controlled naval forces it will be more difficult to secure efficiency than in one navy under one control. The British Empire is passing through a period of transition. The Oversea Dominions are not yet prepared to take upon themselves that full share of the burden of Imperial Defence which would justify them in claiming an equal voice with the Mother Country in the control of Imperial expenditure and Imperial policy. They are showing, year by year, an increasing disposition to play their part, and the problem of Imperial Federation will have to be faced ere long. The difficulties of the transition stage from complete dependence for their protection on the Mother Country to partnership with her in the responsibilities of Empire, can only be overcome by wise statesmanship.

ALEXR. RICHARDSON.
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CHAPTER II.

FOREIGN NAVIES.

FRANCE.

WHEN M. Barthou's Government was defeated on December 2nd, M. Pierre Baudin was succeeded by M. Monis as Minister of Marine, and when M. Monis resigned he was succeeded, on March 20th, by M. Gauthier, a senator and doctor of medicine, who was Minister of Public Works in 1906. The new Minister has had little, if any, experience of naval affairs, but inspired confidence by retaining as chief of his cabinet Captain Salaun, a brilliant officer, who had gained honours at the Superior Naval School, and had shown capacity as Flag-captain and in the work of the flotillas. The Minister also gave a good impression by immediately assembling the newly-constituted Admiralty Council, and declaring his intention of retaining the services of its officers. Captain Salaun had served as chief of the Minister's Cabinet under M. Monis, and obviously, in the frequent changes in the personality of the Minister, continuity of policy must depend upon the permanent officials and upon officers who are the repositories of naval tradition.

M. Monis had been a prominent advocate of naval expansion and a strong supporter of the recent Mediterranean policy of the French Admiralty. His views on the latter subject were summed up in his report on the Navy Estimates of 1910: "L'organisation navale qui convient à notre pays est la suivante: défensive dans la Manche et l'Océan, cette défensive étant, bien entendu, aussi active que possible; offensive dans la Méditerrannée...L'offensive en Méditerranée doit être assurée par la concentration de toutes nos escadres de combat de haut bord, cette offensive n'excluant pas la protection aussi grande que possible du littoral au moyen de sous-marins." The views of his successor as yet indicate no change.

Concentration of the French Fleet.

French policy, culminating in the concentration in the Mediterranean, has followed very closely the lines of British policy. The squadron in the Far East and Pacific was suppressed, the Atlantic division, which used to show the flag in French distant possessions, disappeared, almost all the protected cruisers were scrapped, and on the conclusion of the Entente Cordiale and the opening of the

war in the Balkan Peninsula, the ships were withdrawn to the Mediterranean. But M. Monis gave assurance that the coasts would not be neglected, and there will be torpedo and submarine flotillas, dirigibles or seaplanes at Dunkirk, Cherbourg, Brest, St. Nazaire, and La Rochelle, and new heavy batteries to prevent access to important roadsteads and bays. This policy will be pursued by M. Gauthier.

Mediterranean policy.

The question of the concentration in the Mediterranean is still anxiously debated, and obviously lies at the very root of naval policy. M. Chautemps, reporter to the Senate on the Navy Estimates of 1914, devoted particular attention to this subject. He said it was of vital interest to France to secure her predominance permanently in the Mediterranean, and with that object urged the construction of five super-Dreadnoughts additional to the programme, to restore the balance with Italy and Austria-Hungary. The following observations by a writer of great experience in support of the Mediterranean policy of the French Admiralty are quoted from the *Moniteur de la Flotte* :—

> La meilleure façon de tirer parti d'une union de ce genre, vu le germe de faiblesse que portent en elles les coalitions maritimes, est de départager nettement les zones attribuées aux deux contractants. C'est la seule manière d'assurer la convergence des efforts et d'agir en liaison sans les inconvénients majeurs de la collaboration. Il va sans dire que l'Angleterre doit se charger de la mer du Nord et de la Manche, en rappelant au besoin et sans hésiter tous ses navires de la Méditerranée, et elle défendra la Manche de la bonne manière, soyons en certains, en battant la flotte allemande ou en la traquant dans ses ports. Inversement ou symétriquement, c'est à nous de nous charger de la Méditerranée, où nous avons de si grands intérêts et où il nous faut absolument dominer. Nous n'atteindrons ce résultat qu'en y massant tous nos moyens, y compris nos navires du Nord. Si ceux-ci manquaient au choc décisif qui nous opposera aux flottes italienne et autrichienne, ce serait pour nous une médiocre consolation que de savoir qu'ils exercent une platonique surveillance en Manche.

Concentration policy opposed.

Another writer, whose pseudonym of "C. Pierreval" covers the personality of a very experienced officer, has strongly opposed this view:

> C'est, à mon sens, un grand malheur que nous ayons dû renoncer, par suite de l'insuffisance actuelle de notre flotte, à entretenir des escadres dans le Nord; un grand malheur politique, qui diminue notre marine aux yeux du monde, aux yeux du pays et dont une partie de son personnel sent la douleur et l'humiliation. Rien ne sert de récriminer. Mais sans récriminer on peut souhaiter que ce malheur ne soit pas poussé à son extrême conséquence qui serait l'oubli du rôle que la France a toujours joué et qu'elle doit espérer reprendre comme puissance maritime du Ponant.

M. de Lanessan, a former Minister of Marine, has also attacked the policy in a recent volume, "Notre Défense Maritime" (Alcan, 1914). His chief points are that experience in the Mediterranean is not enough for officers, that the Third Squadron had no fighting value and should be used for training in the Atlantic and Channel, and that the abandonment or neglect of the ports and bases on those seas, and leaving them in a defenceless state, is a most dangerous

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policy. He thinks it necessary to maintain forces in the Mediterranean equal to those of Austria-Hungary and Italy, but insists that the interests of France are greater in the North than the South. "Certes, il sérait fort pénible de voir les rélations de la métropole avec notre Afrique du Nord s'interrompre; mais ne sérait-il pas plus pénible encore de voir les rélations de la France cesser avec le reste du monde?"

Report on the Navy Estimates.

The report presented to the Chamber on the Navy Estimates of 1914 by M. Maurice Manoury is not so important as some of its predecessors. He gives instances of mistakes due to the "watertight compartments" in which the departments of naval construction, ordnance and works operate. In preparing for the installation of the Janney apparatus for fire control one department dealt with it in relation to horizontal movement and the other to elevation, and when the inventor saw the plans he found them quite irreconcilable. M. Manoury would not discourage the initiative of departments, subject at times to "professional neurasthenia," and thinks the departments cannot be amalgamated as has been proposed. His own view is that the Naval Prefect at each port, without having too heavy responsibility placed upon him, might properly establish accord between departments on particular matters after hearing the arguments of their chiefs. M. Manoury concluded his report by explaining the arrangement arrived at by the Naval and Military authorities whereby the coast defences are proposed to be transferred to the Navy.

The Estimates of 1914, as finally voted, amounted to £19,818,052, an increase of £1,131,007 over the amount (exclusive of the extraordinary charge for the Naval programme) voted last year. The votes for the pay and allowances of officers and men show an increase of nearly £400,000. The total amount to be spent on new construction is £10,720,000, of which £4,600,000 is in the Government dockyards and £6,120,000 in private yards. The figures of the Estimates as finally adopted by the Chamber will be found in Part IV.

Battleships completed.

Since the *Naval Annual* was last published the two battleships of the 1910 programme—Jean Bart and Courbet, 23,100 tons, first ships of the Dreadnought type—have been completed and have joined the Fleet. Both vessels were very successful on their trials. The estimated speed was 20 knots. On her ten hours' trial the Jean Bart attained a mean speed of 21·16 knots on the measured mile and of 21·09 knots as the mean of the ten hours' run, the coal consumption being 2449 lb. (actual) and 2654 lb. (specified). On the three hours' forced draught trial the mean speed was 22·04 knots and 22·63

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knots as the best run on the measured mile, with 1·03-in. air pressure. The coal consumption was considerably lower than the estimate. On a 24 hours' consumption and endurance trial at 18·57 knots the coal consumption per mile was 1611 lb. as compared with 1840 lb. estimated. At cruising speed (12·81 knots) the consumption was 937 lb. (actual) and 1080 lb. (estimated). The gun trials were also successful. The France and Paris (1911 programme), which are of the same class, have progressed so rapidly that they are expected to join the Fleet during the summer or autumn. They were commissioned for trials about twenty-nine months after being laid down, showing the remarkable progress which has been made in the French dockyards.

Three vessels of the Lorraine class (23,177 tons) belong to the next programme and are of a new type, in which ten 13·4-in. guns are mounted on the middle line. All are now being completed afloat, having been launched in 1913 as follows:—Provence, April 20th, at Lorient; Bretagne, April 21st, at Brest; and Lorraine, September 30th, at the Chantiers de l'Atlantique, Saint Nazaire. They are to be completed next year. Lorraine class.

Four battleships were included in the 1913 programme (Normandie, Languedoc, Flandre and Gascogne, 24,830 tons), and have all been laid down, being those in which twelve 13·4-in. guns are to be mounted in three quadruple turrets. The class was described last year. The forward turret is set further back from the bow than in the earlier ships, and the pitching is expected to be reduced. These ships will have longitudinal bulkheads of a new type, being hollow steel walls 6 in. thick. The Normandie, Gascogne, and Flandre are expected to be launched in September. During last year the principle was adopted of constituting squadrons of eight ships, and this fact, coupled with the necessity of laying down certain cruising vessels, has led to additions to the programme. To the four Jean Barts and the three Lorraines another is to be added, the Béarn (originally named the Vendée), nominally a Lorraine, but actually of the Normandie class. Provision is made for her construction this year, and she is to be laid down at La Seyne in June. She will have turbine engines of 36,000 H.P. and Niclausse boilers. Normandie class.

Although there is no certainty as to the date of beginning battleships to follow the Béarn, a design for them has been discussed which shows an armament of sixteen 13·4-in. guns in four quadruple turrets, upon a displacement of 29,500 tons, without increasing the draught or speed. The names mentioned for these ships are Lyon, Lille, Duquesne and Tourville. Two of them are proposed to be laid down early in 1915. Intended Duquesne class.

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Scouts and flotilla leaders.

The Naval Council discussed early in February the plans of the squadron scouts of 6000 tons intended to be built by M. Baudin, it being proposed to substitute a smaller type apparently for a different purpose. The manœuvres of 1913 had, however, shown the want of scouting vessels, of which none have been built for about fifteen years, and it has been decided that the three proposed by M. Baudin shall be built. In addition it is intended to lay down this year three vessels of a new super-destroyer type, about 4500 tons, described as "conducteurs d'escadrilles," to be armed with six 5·5-in. guns, and to have a speed of 30 knots. They are intended to serve with destroyer flotillas, and at the same time to be useful for scouting purposes.

Destroyers.

During 1913 the following large destroyers (750–862 ton class) were completed:—Boutefeu, Faulx, Dehorter, Commandant Rivière, Bisson, Renaudin, Capitaine Mehl, Commandant Bory, and Francis Garnier. On her six hours' full-speed trial the Bisson obtained a mean speed of 31·05 knots and the Renaudin of 30·55 knots, the latter in a heavy sea; they have Breguet turbines. The Protet, Magon and Mangini have been launched.

No destroyers or torpedo-boats are included in the programme of 1914, but four other destroyers—Commandant Lucas, 755 tons, and three of 880 tons, all 30-knot boats—are in hand. Two destroyers of 1200 tons, to be built at Rochefort, are in the programme of 1915.

Submarines.

Twenty submarines were laid down in the years 1910–13, being ten of 408 tons (Clorinde class), three of 512 tons, two of 787 tons, three of 820 tons, and two of 620 tons. The Clorinde and Cornélie have been completed, and the remaining boats of the same class, Amphitrite, Astrée, Artémis, Aréthuse, Atalante, Amaranthe, Ariane and Andromaque, will be taken over this year, as well as the Gustave Zédé (787 tons), and the Bellone, Hermione and Gorgone (512 tons, 2100 H.P., 17·5 knots). It was intended that the Gustave Zédé should have Diesel engines, 4800 H.P., to give a surface speed of 20 knots, but the builder could not guarantee more than 16 knots, and other motors were adopted for that speed. The Néréide, sister of the Zédé, may have Diesel engines, but temporarily this type of motor for high powers has been abandoned. Five additional submarines of 820 tons, with anticipated speed of 20 knots, are to be begun in 1914, and vessels of a larger type (1100 tons) are intended for 1915. They will have ten torpedo-tubes.

The programme of 1914 also includes a mine-laying vessel.

A sum of £800,000 is to be spent this year in providing docking accommodation for the new big ships.

Personnel.

A Bill for bringing the organisation of the *personnel* into accordance

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with the requirements of the Navy Law programme was introduced into the French Chamber on November 4th. Its object was to modify the law of June 10, 1896, and it proposed the re-establishment of the rank of *capitaine de corvette*, equivalent to that of major in the Army. The main reason for this was that the Ministry of Marine considered it essential to afford to officers, as compensation for the risks of a career in which success was so uncertain, the prospect of obtaining early the advantages, moral and material, which attach to the status and position of a senior officer. The following establishment for the various ranks was embodied in the Bill:—16 vice-admirals, 30 rear-admirals, 115 captains, 210 commanders (*capitaines de frégate*), 325 *capitaines de corvette*, 830 lieutenants, and about 740 lieutenants under eight years' seniority and sub-lieutenants. A scheme for employing warrant officers in some appointments hitherto filled by lieutenants made it possible to adopt this establishment, which otherwise would not have sufficed.

Improvements have been introduced in the pay of officers. The highest sea-pay of a vice-admiral is £935, of a captain £500, a commander (*capitaine de frégate*) £400, and of a lieutenant £220 to £300. These figures are independent of certain allowances, which appear to be compensated for in certain categories of shore employment, which carry higher pay. There is a slightly lower scale of sea-pay for some categories of employment. Concessions have also been made to warrant officers and to all classes of men on the lower deck. Pay is better, promotion is improved, and the conditions of service and leave are more advantageous. By common consent, what is required is more care for the men ashore, with opportunities of healthy recreation and occupation. **Pay.**

An administrative change was made in September by constituting an Admiralty Council consisting of the heads of the three great departments, the chief of the Cabinet, and the Minister as President.

Important manœuvres took place in the Mediterranean in May and June, including an operation of blockading Toulon. Risks were run which would not have been run in war. The blockaders retained their main forces less than thirty miles from the port, but withdrew at night in dispersed formation. Want of cruisers placed them at a great disadvantage, and the blockade was ineffective. The submarines were very successful, and inflicted many losses on the blockaders. They showed at Bonifacio that a squadron cannot safely pass through narrow waters in which they are present. There were several battle actions, induced by the director of the manœuvres, but they appear to have presented no remarkable features. The extended operations gave wide experience to officers and men, and the manœuvres **Manœuvres.**

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concluded with a great review at Toulon. The Cruiser Squadron and flotillas in the north were also engaged in manœuvres from July 3rd to July 20th. In one operation three cruisers attempted to escape from Brest, but fog interfered. Other exercises had reference to the forcing of the Strait of Dover, an attack upon Havre, and a landing on the coast of the Cotentin.

Germany.

The features of the German Navy Law, amended in 1912, were fully stated in the *Naval Annual* last year. Here it may be enough to say that by the year 1920 the Fleet is to consist of forty-one battleships (of which twenty-four will be so-called Dreadnoughts), twenty "large cruisers" (of which eleven battle-cruisers), forty small cruisers, 144 destroyers and seventy-two submarines, of which last mentioned six are to be built each year. No date has yet been assigned for the laying down of the third capital ship or the three small cruisers of the additional programme.

Official statement of policy.

In discussing the naval position in the Budget Committee of the Reichstag on February 3rd. Grand Admiral von Tirpitz, State Secretary for the Navy, said he had nothing to add to his statement of last year, and that a ratio of sixteen to ten in capital ships was still acceptable to Germany. "We have never," he said, "with our naval policy pursued any aggressive tendencies with regard to England." He interpreted the formula in the terms of eight British squadrons to five German squadrons. Germany would require to replace two battleships a year, and more was not intended. In the full discussion in the Reichstag, February 20th, the Naval Secretary made a very important statement. Both from the National Liberal and Conservative sides the despatch of warships to foreign waters had been urged. The Admiral welcomed the suggestion. He said that the political and economic advantage of the appearance of the Fleet abroad was not in many cases fully appreciated.

It is not only a political and economic necessity, but a military necessity, that we should bestir ourselves in foreign service. All navies must be in close touch with distant seas and conditions abroad. In recent years we have not done this to the extent which we ourselves would have wished. That has been due to circumstances which I need not explain in greater detail—to the concentration of our Fleet in Home waters. It is not a question now of creating a special Mediterranean Division, but of increasing the activity of our Fleet abroad in general. Unfortunately, we have not yet nearly reached the number of ships which, according to the Navy Law, should be serving in foreign waters, a fact which has lately been felt in an especially disagreeable manner. Last year part of our East Asiatic Squadron was urgently needed in the South Seas, but the ships had to be recalled on their way thither because they were more urgently needed in China. It was equally unsatisfactory that we had to despatch a ship from the East Asiatic Squadron to Western American waters. Our need in the Far East is not fully met. It will indubitably be the aim of the next few years to reach, within the limits of the Navy Law, as soon as possible, the number of ships assigned by the Navy Law for foreign service.

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The naval expenditure for the year was estimated as follows:— Recurring ordinary expediture, £11,053,130; non-recurring ordinary expenditure, £11,873,977; extraordinary expenditure, £1,470,500, giving a total of £24,397,607. The cost of keeping the ships in commission was £3,349,500, which is an increase of nearly £500,000. The estimate for submarines was £950,000, and the Vote which includes airships and aeroplanes among other various things was £422,500. New provision is made for storage of oil fuel. struction.

Battleships.

The battleships Kaiserin, Prinzregent Luitpold, and König Albert (24,310 tons, 1910 programme) have been completed and taken over. The five ships of this class are now in commission. From laying down to commissioning they have each been about three years in hand. Their trials are known to have been very successful, but details are scanty. The Kaiser and Friedrich der Grosse, the first vessels of the class, attained mean speeds respectively of 22·3 knots and 21·4 knots on their six hours' full-power trials, and of 23·5 knots and 22·4 knots on their forced-draught trials. No official reports on ship trials are published. The König Albert twice touched the bottom during her trials, but was not damaged seriously.

With the launch of the Kronprinz (ex Ersatz Brandenburg), on February 21st, the last German battleship mounting 12-in. guns entered the water, and the last of the programme of 1912. Three battleships of the same class (1911 programme) were launched in 1913 — König, March 1st (Wilhelmshaven); Grosser Kurfürst, May 5th (Vulcan Yard, Hamburg); and Markgraf, June 4th (Weser Yard, Bremen)—and are to be completed this year. These four ships are of the König class. Displacement, 26,575 tons; length, 580 ft.; beam, 97 ft.; draught, 27 ft. 3 in.; ten 12-in. guns in double turrets on the middle line, the penultimate pairs firing over the forward and aft pairs, fourteen 5·9-in. and twelve 3·4-in. Protection: belt, 14 in., reducing to 6 in.; side armour, 8 in.; big guns, 14 in.; deck, 3 in.; conning tower, 16 in. Five torpedo tubes; 35,000 I.H.P.; speed, 23 knots; coal, 1500–3000 tons; oil, 600 tons; complement, 1150.

The class are not remarkable for any striking development in type, and as regards the main features, the progress made since the launch of the Nassau appears to be less than in other countries. The Germans appear to be from two to three years behind Great Britain in the matter of the calibre of guns, and as in 1908 they were launching ships armed with 11-in. guns, when British vessels of corresponding date were being equipped with 12-in., so they have

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recently put afloat ships with 12-in. guns, although we have passed to 13·5-in. and 15-in. weapons.

The battleships Ersatz Wörth and T, the latter being the first of the three ships to be built under the 1912 amendment, will be of a different type, and will approximate closely to the British Queen Elizabeth class. They will mount eight 15-in. guns in four double turrets on the middle line, with secondary armament of sixteen 5·9-in., and a number of 3·4-in. guns. Only one battleship is assigned to the year 1914, viz., the Ersatz Kaiser Friedrich III. The new German 15-in. gun was described in the *Naval Annual* last year, and its characteristics will be found in the Ordnance Tables.

Battle-cruisers.

Six battle-cruisers are now afloat, four of them having been completed. The Seydlitz is stated to have steamed at 29 knots, with 100,000 H.P. She is armed with ten 11-in. and twelve 5·9-in. guns, and is therefore a repetition of the Moltke and Goeben in offensive power. She differs from them in being of slightly larger dimensions. The forecastle is raised about 30 ft. above water, which gives the forward guns a high command of fire, and enhances the sea-going qualities of the cruiser. The belt is 9 ft. 9 in. in depth, two-thirds of it below water. The thickness at the water-line is 11 in., at the lower edge 6 in., tapering at the ends to 4 in. The armour on the bulkheads is 8½ in., on the citadel 7¾ in. to 11 in., and on the conning-tower 12 in. thick. For submarine protection there are longitudinal steel bulkheads, 10 ft. inboard and 2 in. thick. The Derfflinger (programme 1911) was launched by Messrs. Blohm & Voss at Hamburg, June 14th, and is to be completed this year, and the Lützow (ex Ersatz Kaiserin Augusta, programme 1912), by Schichau at Danzig, November 29, 1913. The Derfflinger is armed with eight 12-in., twelve 5·9-in., and twelve 3·4-in. guns. The same main armament, it was stated by "Nauticus," would be mounted in "the following ships"—viz., the Ersatz Hertha, which is building at Wilhelmshaven, and Ersatz Victoria Luise, which is to be laid down in 1914.

The completion of ships is enabling the organisation of the Fleet to proceed. Until the Kronprinz is commissioned, the new Third Squadron will be one ship short. It is stated that when the other three ships of the König class join the Fleet, the Hessen, Preussen, and Lothringen—all pre-Dreadnoughts—will follow the Braunschweig and Elsass out of commission. When the battleships in commission are brought up to twenty-five, there should be eight large and twelve small cruisers, but at present there are not many more than half the number. The placing in reserve of five pre-

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Dreadnoughts may be partly due to shortage of *personnel*, but mainly to the insufficiency of the sum allotted for maintenance in commission. In a year or two, however, both these obstacles will have been overcome, and the High Sea Fleet will then be kept at its full strength of twenty-five battleships in active commission.

The Kaiser and König Albert, accompanied by the cruiser Strassburg, have made a cruise to East Africa and the principal ports of South America.

The small cruisers Karlsruhe and Rostock, 4820 tons, have been completed. The former, which has Parsons turbines of 26,000 H.P., made most successful trials, and was taken over from the Germania yard, the main and auxiliary machinery having worked perfectly, and the contract speed of 27 knots having been easily exceeded. The Rostock is reported to have attained a speed of 29·2 knots in Danzig Bay. These cruisers, like most of their predecessors, mount twelve 4·1-in. guns. The Graudenz, launched at Kiel, October 25th, and the Regensburg, at Bremen, April 25th, are reported to be of over 5000 tons and 30,000 H.P., with speed of 27·5 knots, and the same armament. The Ersatz Hela and Ersatz Gefion are in hand, and two additional vessels of that class—Ersatz Gazelle and Ersatz Niobe—are to be begun this year. In the Ersatz Gefion (45,000 H.P.) Föttinger transformers are being fitted in connection with the machinery installation; also in the new Imperial yacht and in three destroyers. Cruisers.

Twelve destroyers are put in hand every year. The twelve of 1912–13 (S 13–S 24) have been completed, twelve are building (Nos. V 25–V 30 and S 31–S 36), and the flotilla to be laid down in 1914–15 (Nos. 37–48) will bring up the total number to 164, of which about 140 have been completed. The boats of 1910–11 were of 640 tons, but there has since been a reduction to 560 tons, with horse-power of 15,000 as compared with 16,000, and the complement reduced from eighty-three to seventy-three. The designed speed of all the recent boats is 32·5 knots, and they carry four tubes for 20-in. torpedoes, and mount two 3·4-in. guns and four machine guns. S 23 steamed at 37 knots. The boats are kept very actively at work, and no fewer than 194 destroyers and torpedo-boats were in service last year, some of them being placed in and out of commission four or five times during the year. The Seventh Destroyer Flotilla at Wilhelmshaven has been brought up to a strength of eleven boats of the latest classes, making a total of seventy-seven of these boat in active commission. The boats of the 1913–14 programme are to form the Eighth Flotilla, which is expected to be constituted in October. The German destroyer programme is carried forward with great promptitude and despatch. The salvage of G 171, which was Destroyers.

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sunk near Heligoland in September, 1913, has been definitely abandoned.

Sub-marines.

The submarine boats completed number about thirty, all built at Danzig Dockyard and by the Germania Yard, Kiel. Several are in hand, including one at the F.I.A.T.-San Giorgio Yard, Spezia. A new series is said to have begun with U 21, 213 ft. 3 in. long, 20 ft. beam; three tubes and two guns mounted forward. The later boats have a displacement of 800 tons. During 1913 twenty-four submarines were kept in commission, six having joined during the year. The *North German Gazette* says that little is heard of the submarine service, "for in this department the Navy does its work without desiring publicity." The inspection of submarines has been separated from that of the other flotillas, and is now located at Kiel with a flag officer as its chief. The *personnel* of the branch has been largely increased.

New Imperial

The new Imperial yacht Hohenzollern, which is under construction at the Vulcan Yard, Stettin, is officially designated as an auxiliary cruiser, and in time of war would carry a strong armament of quick-firing guns. The lines have been drawn to combine stability and high speed. The double bottom extends the entire length, and the hull is sub-divided by longitudinal and transverse bulkheads carried up to an unusual height, many of them being unpierced. To ensure steadiness, Frahm anti-rolling tanks and wide bilge keels are provided. The present Hohenzollern is not a good seaboat. The new yacht will be propelled by geared turbines on the Föttinger system. She is designed for 24 knots with 30,000 H.P., and a number of boilers will be fired with oil.

The gunboat C—1150 tons, length 220 ft., beam 33 ft., draught 10 ft., two sets triple-expansion engines, four Schulz-Thornycroft boilers, 14 knots, four 4·2 in. and four machine guns—is in hand at Danzig.

Dock-yards.

The great work of widening the Kaiser Wilhelm Canal, involving the building of one of the longest railway bridges in the world, is expected to be fully completed this year, so that the biggest ships will be able to pass between the Baltic and North Sea. Provision is made in the Estimates of 1914 for considerable additions at the ports. A floating dock for destroyers is to be completed for Wilhelmshaven, where torpedo works are to be installed at Mariensiel. At the same port there are to be new mooring berths, a new breakwater is to be erected, and the gunnery shops are to be equipped for much of the repair work that has hitherto been undertaken at Essen. The torpedo establishments at Kiel are to be enlarged, and a second large floating dock is to be put in hand. For each of the ports an oil-

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tanker is to be built, and for Wilhelmshaven an additional dredger. The work at Heligoland is approaching completion, and the last instalment is provided this year of a sum of £1,600,000, which was voted in 1908. A great work has been executed in hardening and protecting the cliffs against erosion by air and sea, and breakwaters and walls have been built forming a protected harbour for the flotillas. The island is heavily fortified. It is to become an aeroplane station.

Provision is made for increasing the *personnel*, in accordance with the establishments of the Navy Law, by one vice-admiral in place of a rear-admiral, eight captains, fifteen frigate and corvette captains, thirty-two captain-lieutenants, seventy-eight senior lieutenants and lieutenants, six engineer officers, and 5973 warrant and petty officers and men. *Personnel.*

There are now about 120 officers of the German Mercantile Marine who hold commissions in the Naval Reserve, and it being considered that they have no sufficient means for keeping abreast of naval developments, money has been voted this year to enable longer courses, of a year, to be introduced for such as volunteer for that period to serve on board ships of war.

Returns recently made of recruiting for the Navy in 1912 show that 22,004 men were embodied, of whom only 4214 came from the maritime population, while 12,247 were from inland districts, 857 were one-year volunteers, and 4659 were volunteers for longer periods.

A marked development has taken place during the year in the naval aerial branch, despite the catastrophes it suffered in the loss of dirigible L 1 near Heligoland, September 9th, with fourteen lives, and the terrible catastrophe when L 2 was destroyed at Johannisthal with twenty-seven officers and men, October 17th. New naval sections have been established, namely, an airship and an aeroplane detachment, while the project of an airship harbour near Cuxhaven is being carried out. At that place all the Navy's new airships are to be assembled in revolving sheds. A start has also been made with the creation of a chain of aeroplane stations round the coast. The coming summer will find the Navy again in possession of two large dirigible airships. Air service.

The Imperial Navy Office has been removed from its incommodious premises in the Leipziger Platz, Berlin, to a fine new building in the Königin-Augusta-strasse.

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ITALY.

Since the *Naval Annual* was last published the Italian Navy has been passing through a period of preparation for what promises to be a large expansion of the Fleet. The war with Turkey, the acquisition of Libia, and the struggle in the Balkans, all showed that Italian policy required the support of a strong fleet. The concentration of the French forces in the Mediterranean has not been without influence on the situation. Signor Giolitti, President of the Council, speaking in December in the Parliament, said that Italy's need of a fleet required no demonstration. "La geographia è l'argomento capitale in questa materia." The outcome has been the decision to build four powerful battleships, estimated to be completed in 1917, and thence onward to begin one in each year. In the Estimates for 1914–15, the sums for these purposes, available under the laws of June 27, 1909, and July 2, 1911, are mentioned only *per memoria*.

Programme.

Admiral Leonardi Cattolica resigned the Ministry of Marine, on grounds of health, in July, and was succeeded by Rear-Admiral Enrico Millo, who was the officer in command of the famous raid of Italian destroyers in the Dardanelles during the war with Turkey. An attack had been made upon Admiral Cattolica for the delay in beginning the additional battleships, but time was evidently required to overcome the difficulties of the problems which are involved in the design, building and financing of four ships of 28,000 tons, heavily protected, each carrying eight 15-in. guns, and having a speed of 25 knots. The design of ships is closely related to the ordering of material, but the problem is believed to have been so far solved that ship-plates, armour and guns have been put in hand, with the object of avoiding delay. The four ships are in the programmes from 1914–15 onward.

Battle-ships.

The following table shows the ships of recent programmes :—

—	—	Displacement.	Laid down.	Completion.
Conte di Cavour	Spezia . . .	22,340	August, 1910 .	Summer 1914.
Leonardo da Vinci	Odero, Genoa .	22,340	July, 1910 . .	Early 1914.
Giulio Cesare .	Ansaldo, Genoa	22,340	June, 1910 .	Early 1914.
Duilio . . .	Castellammare	23,025	April, 1912. .	Early 1915.
Andrea Doria .	Spezia . . .	23,025	March, 1912 .	Early 1915.
G.H.J.K. . .	...	28,000	Uncertain . .	...

The Giulio Cesare has undergone successful trials. On November 4th she attained a speed of 23 knots, with 34,000 H.P., being half a knot in excess of the contract. There has been delay in

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delivering American armour-plate and guns. Two cruisers have represented the Giulio Cesare and Leonardo da Vinci in the First Division of the Fleet. The Conte di Cavour is to join the fleet in the summer.

The Andrea Doria and Caio Duilio, the fifth and sixth Italian Dreadnoughts, were launched respectively at Spezia, March 30, and at Castellammare, April 24, 1913. The first-named has proceeded to Genoa for completion, and the other will follow. They belong to the Giulio Cesare class, with thirteen 12-in. guns in three triple and two double turrets on the middle line, but the secondary armament —sixteen 6-in. guns—is distributed in two groups—one forward and the other abaft—instead of in a single group amidships. Their torpedoes will be of a 21-in. type, which is also being supplied to the new destroyers. Hitherto the Italians have been content with the 18-in. The Andrea Doria and the Caio Duilio are to be completed in the autumn of 1914.

In the design of the ships of the new class the triple turret will be abandoned. Experienced officers and ordnance constructors have doubted the wisdom of this plan from the beginning. In June a council of admirals declared in favour of double turrets for 15-in. 40-calibre guns. The chief of the ordnance service, Rear-Admiral Bertolini, and the new chief constructor of the Italian Navy, Major-General Ferretti, concurred. A plan analogous to that of the Queen Elizabeth class was adopted, with eight 15-in. guns coupled in turrets on the middle line. The following further particulars are given: Displacement, 28,000 tons; length, 670 ft.; beam, 98 ft.; secondary armament, eighteen or twenty 6-in. guns; the ships to burn coal and oil; speed 25 knots; water-line protection amidships 12 in.

The contracts for supplying guns for the ships were to be divided between the firms of Armstrong (Pozzuoli), Vickers-Terni, and Ansaldo. The guns to be made by the two first-named firms would be of the wire-wound type, while those of Ansaldo would be built-up. It is interesting to note that the triple turrets for the 12-in. armament of the Leonardo da Vinci were built and equipped by Messrs. Vickers at Barrow. The ships are known as G, H, J, and K, and the names of Dandolo and Morosini appear to have been given to the first two. Of these ships one is intended to be built at Castellammare. In the Estimates of 1914–15 provision is made for only one of the four ships, and uncertainty attends the dates for the beginning of the others.

The new scout cruiser, Nino Bixio, 3400 tons, attained on her trials 28 knots, with 24,000 H.P. and 430 revolutions. The speed of the Quarto was 28·6 knots. Boiler troubles have caused a good Cruisers.

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deal of difficulty, and in the Quarto several men were injured by bursting tubes. These vessels and the Marsala have been converted to burn coal instead of oil. They are intended to act on occasion as minelayers, and have special magazine storage for a large number of blockade mines. The Mirabello and a sister, cruisers or scouts of a 5000-ton class, will be begun early in the summer. This type will have an estimated speed of 27·5 knots. Protection will be given by vertical armour on the water-line and a steel deck. The armament is to include 6-in. Q.F.

The two small cruisers Basilicata and Campania, 2460 tons, intended for foreign service, were laid down at Castellammare on August 9th.

Destroyers.

The destroyer Audace reached a speed of 35·5 knots on her three hours' trial, developing 20,000 H.P.; the Ardente 35·4 knots, and the Animoso over 37 knots. These are 690-ton destroyers built by Orlando, and are of the same type as the six boats of the Impavido class recently completed by Pattison. The following are mean speed trials of some of these boats: Indomito, 35 knots; Intrepido, 35·1 knots; Irriquieto, 35·8 knots. These boats burn oil only and have Tosi turbines. Messrs. Pattison have in hand four other destroyers (Impavido class improved) and Odero (Genoa) six of the same type. Three destroyers shortly to be laid down by Ansaldo at Genoa will displace 1000 tons, and mount ten 4-in. guns, with two double torpedo tubes. Designed speed 35 knots.

Messrs. Pattison have completed the six 120-ton torpedo boats, 33–38 PN, and two others, 39 and 40 RM., are in hand at Spezia.

Submarines.

The submarines Nautilus, Nereide, Atropo, Zœa, Jantina and Jalea —225–320 tons—and Galileo Ferraris and Giacinto Pullino—345–400 tons, F.I.A.T. motors 750 H.P.—have been completed. The last-named attained a speed of 18 knots on the surface, and nearly 14 knots submerged. The Nautilus, Bernardis type, succeeded brilliantly at her trials, and proceeded in the worst weather conditions from Venice to Taranto. The engines are by Sulzer of Winterthur. The Nereide has also been successful (15 knots, with oil engines, on the surface, and 9 knots, with accumulators, submerged). It is intended to construct henceforth two classes of submarines, one for coast defence, about 250 tons, with 13 knots surface speed, and the other for sea-going duties, of about 700 tons, with speed of 18 knots. Six of the larger class and six of the former are required to complete the programme. There are now four classes: Zoea, 300 tons; Ferraris, 400 tons; Nautilus, 221 tons; Atropo, 320 tons. A salvage pontoon of a new type, the Anteo, has been built by the Smulders firm at Schiedam. She is to

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be capable of accompanying a squadron at sea, and has a total lifting power of 400 tons, which can be raised from a depth of 200 ft. by means of two derrick-cranes, so arranged as to vary the lifting points from 40 ft. to 60 ft., according to the length of the submarine to be raised, and on reaching the surface the boat can be brought within board.

Five oil tankers, Acheronte, Flegetonte, Lete, Stige and Cocito, 760 tons capacity, and two larger (6000 tons), Givoe and Nettuna, are in hand at Genoa.

Gunnery.

The battle practice of the Fleet was carried out on a larger scale than before. Every commissioned ship took part, and the conditions were more severe than on former occasions. The scene of the practice was Aranci Bay. For the battleships and cruisers with heavy ordnance the range was fixed at 8000 mètres, and all the targets were towed. The King of Italy was present on board the Dante Alighieri. The authorities have not published any particulars of the practice, but according to Italian papers the results showed a marked increase in efficiency for all classes of guns.

Grounding of San Giorgio.

The armoured cruiser San Giorgio ran aground at Santa Agata in the Straits of Messina on November 21st, and is being repaired at Taranto, at a cost of about £22,000. The damage was very considerable, but not of such a nature as permanently to affect the ship. The salvage operations were carried out most efficiently. When the cruiser grounded the forward boiler-room, the double bottom under the bow torpedo chamber, and the magazines in the fore part of the ship were all flooded, some 1500 tons of water entering. Before the cruiser could be refloated it was necessary to dynamite the rocks, among which the bow was wedged. It was difficult to work with caissons owing to the shallowness of the water. When the ship had been lightened by the removal of coal, ammunition, guns, turrets and even some of the armour plating—the weight removed amounting in all to 1500 tons—she was towed off. The grounding was due to an error of navigation.

Personnel.

An increase of *personnel* by 3000 men is taking place, and in the year 1917, by annual additions, the executive officers are to number 1111, the engineers 295, and the surgeons 232. A very significant change, resembling that which has been introduced into the British service, is being introduced. The measure passed the Senate by two votes only, many of the senior naval and military officers opposing it. The executive and engineer officers are to have a common entry, and to pass together through a four years' course at the Leghorn Academy. The Minister showed that Admiral Mirabello and his successors had carefully prepared for this change,

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which would put an end to the crisis that had arisen in regard to the *personnel*. The unified corps of officers will be known as the Corpo dello Stato Maggiore Generale.

Austria-Hungary.

It has not been found possible to carry forward with the anticipated rapidity the programme instituted by Admiral Count Montecuccoli. That programme, as is well known, is based upon an establishment of sixteen battleships, at present represented by the four of the Viribus Unitis class, three Radetzkys, three Erzherzogs, three Habsburgs, and finally three Monarchs. The necessity of forming divisions of four ships makes it necessary to lay down four battleships, replacing the three Monarchs and one of the Habsburgs. But the enormous charges for the Army, which are bound to go on increasing, and the heavy burden caused by the mobilisation during the war, being some £16,500,000, with the resulting financial stringency, have made it impossible to provide money for the four ships for some months to come, though it was asserted during the summer and autumn of 1913 that they were actually in hand. Before the Delegations it was stated that credits had been deferred "to better times" by an understanding with the War Minister. The Navy Estimates were for the first six months of 1914 only, and they included no provision for additional battleships. The Budget henceforth will cover the latter half of one year and the first half of its successor. Admiral Haus announced his adherence to the programme of his predecessor, which provided that the Navy, by means of "successive substitutes for worn-out ships incapable of meeting present exigencies," should be kept at a numerical strength of sixteen battleships as indicated above, twelve cruisers, twenty-four destroyers, twenty-four torpedo-boats, twelve submarines, eight monitors and some training ships. The Marine Commandant referred to the quality of the Dreadnoughts in service as entirely satisfactory.

Battle-ships.

Of the first Dreadnought division three ships, all driven by Parsons turbines, were built at Trieste. The Viribus Unitis and Tegetthoff were completed in 1913. The Prinz Eugen will be completed this summer. The fourth of the class, the Szent Istvan (German A. E. G. turbines), was launched on January 17th, at the Danubius Yard, Fiume. She is the first Dreadnought to be built in Hungary, and is of the same dimensions and armament as the other three ships. Practically two years had elapsed since construction was begun, but the establishment had previously built only small craft, and there were also labour troubles. It is expected that the

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Szent Istvan will be completed early in 1915. All the battleships burn both coal and oil. They have magazine cooling arrangements, which can be controlled at a central station.

It is probable that the features of the additional four ships have not yet been determined. According to statements in the *Zeit* and other papers, the ships will have a displacement of 24,500 tons, as compared with the 20,000 tons of the four vessels in the first division. Their main armament will consist of ten 14-in. or perhaps 15-in. guns, with a length of forty-five calibres, supplied by the Skodawerke at Pilsen. The earlier Dreadnoughts have twelve 12-in. guns. An important difference will be made in the matter of the distribution of armament, the triple turret system of the Viribus Unitis class being abandoned in favour of a return to twin turrets. Anti-air-craft guns will also be carried, and the vessels will be provided with strong screens for protection against aerial attack. The estimated cost of the four ships is £13,660,000. The expenditure will be spread over a period of five years, and a first instalment of nearly £2,000,000 is in the Estimates of 1914–15, which amount to a total of £7,386,083. The total cost of the new programme will be £17,784,830.

Of the Scout cruisers, the Novara, 3500 tons, was launched at Fiume early last year, and with the Saida and Helgoland, of the same class, is to be completed in 1914. These vessels burn oil only. Three others of 4800 tons are to be laid down and will cost nearly £2,000,000. Scouts.

The six destroyers of 800 tons, Tatra class, built at Fiume, have been completed, and have steamed on trial at 32·5 to 33·3 knots. The Tatra's speed was 33·25 knots. Six others are to be built. Torpedo craft.

Orders have been given for the construction of fifteen sea-going torpedo-boats, in addition to the twelve which are already in hand at Trieste and Monfalcone. The new boats will be built at Fiume and Trieste, and will be of 250 tons, have engines of 5000 H.P. to give them a speed of 29 knots, and carry two torpedo tubes and three 12-pdr. guns. These boats are henceforth to be indicated by numbers and the initial of the building yards on the German plan. The eight Trieste boats are 74 T to 81 T, the sixteen Fiume boats 82 F to 97 F, and the three Monfalcone boats 98 M to 100 M.

Fourteen submarines are in the list, of which six are of the 230–300 tons type. The others, for which provision has been made by the Fleet Law, and by supplementing credits and the votes of 1913, will be much larger, and it is believed will reach a displacement of 1000 tons, and will have five tubes and several quick-firers. Submarines.

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Six of them were contracted for by the Germania yard, Kiel, of which two are ready and the others are to be completed in 1915.

The Chamaleon, a mining vessel of 1800 tons, the fleet colliers Pola and Teodo, of 7000 tons, and some other small craft are completing.

The Lussin is being filled experimentally with heavy oil engines.

The Arpád, last of the Habsburg class to be taken in hand, is being refitted, and her upper works are being cut down.

Two Danube monitors, M 07 and M 08, are to be completed this summer, and two others are to be built.

Naval bases.

A good deal of work is in hand at the naval stations. The coaling base at Teodo, on Cattaro Bay, has not yet been completed, and work is still in hand at the magazines at Vallelunga, where machinery for dealing with guns is being installed. At Pola, the building slip is being reconstructed, oil tanks are being provided and an oil depôt, and engineering shops and stores are being erected, as well as a central electric station. The entrance between Sant' Andrea and Santa Caterina is being dredged. Much other work is in hand at the port, which is becoming a much more important administrative and constructive naval base. Santa Caterina Island has been converted into an aviation station. The Balkan situation has led to other developments, and Sebenico has been established as a naval station, with a rear-admiral in command, the first grant being made in the 1914 Estimates.

Personnel.

The *personnel* are being increased in accordance with the programme of shipbuilding. The men, by progressive additions—the annual contingent being increased to 8000—will in 1915 number 27,000, being 11,500 more than the present strength. In 1914, 1700 additional men, 200 boys, and 100 for the artificer staff will be taken into the Fleet.

Admiral Haus has reported on the mobilisation during the Balkan crisis. About 10,000 reservists were embodied at Pola, this being the first occasion for forty-seven years that the whole of the Fleet has been commissioned and manned chiefly by reservists. The behaviour and efficiency of the men embodied convincing Admiral Haus that the nation possessed in its reservists a force almost equal in quality to the regular *personnel*. The mobilisation, which placed the Navy on a war footing, was carried out with the greatest smoothness and promptitude.

The Navy sustained a great loss by the death, on August 26th, of Vice-Admiral Count Lanjus von Wellenburg, who was mortally injured by the blowing out of the breech-block of a 12-in. gun during

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trials at Pola. Three men were killed instantly by the explosion. The Admiral was president of the Technical Committee at Pola, in which office he has been succeeded by Rear-Admiral Njegovan.

Russia.

The broad features of the programme for the reconstitution of the Russian Fleet, which Admiral Grigorovitch, Minister of Marine, has in hand, touching every department of the Navy, material and personal, was described last year. The full programme covers the construction of the following vessels, as well as many auxiliaries:—twenty-four battleships (including the four of the Gangut class now completing), twelve armoured or battle-cruisers, twenty-four other cruisers, 108 destroyers and torpedo-boats, and thirty-six submarines. The "small programme" applies to the five years 1913–17, and involves an expenditure of £54,000,000, of which £7,775,054 has been voted in 1914. The Duma Committee struck out a sum of about £8,000,000, which was assigned for work at the naval ports of Reval, Kronstadt, Sveaborg, Sevastopol, Nikolaieff, and Vladivostok. A sum of about £325,000 was voted for the object in 1912, and in 1914 over £1,000,000 has been granted.

Programme.

The ships to be built are four battle-cruisers—Borodino, Navarin, Kinburn, and Ismael—for the Baltic; four cruisers, of 7600 tons, also for the Baltic; two of the same class for the Black Sea, and two, of 4300 tons, for the Far East; thirty-six destroyers or torpedo-boats for the Baltic; eighteen submarines (twelve for the Baltic and six for the Far East); three oil tankers, fifteen mine-sweepers, three submarine salvage vessels and other auxiliaries; also two floating docks and three floating cranes, eight tugs and other harbour craft. Important changes at the Obukoff steel works and the Baltic and Admiralty Yards are included in the programme.

The official statement shows that, according to the full programme, the big ships are to be built in series of fours, in order that homogeneous divisions may join the Fleet in the years indicated.

Laying Down.	To Join Fleet.	—
1913	1916	4 battle-cruisers (Borodino class).
1915	1918	4 battleships.
1917	1920	4 ,,
1919	1922	4 battle-cruisers.
1921	1924	4 battleships.
1923	1926	4 ,,
1925	1928	4 battle-cruisers.
1927	1930	4 battleships.

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These ships are for the Baltic, where the intended organisation is a fleet comprising two Battle Squadrons, each comprising eight ships, with a squadron of eight battle-cruisers, as well as a reserve Battle Squadron and a Battle-Cruiser Division, and eight scouts, thirty-six destroyers, and twelve submarines to each squadron. The programme for the Black Sea is not numerically stated, but the fleet there is to be half as strong again as the combined fleets of the neighbouring States (Turkey, Bulgaria, and Roumania). For the Far East there are to be eighteen destroyers, twelve submarines, three coast-defence ships, and two light cruisers. Battleships and battle-cruisers are to be replaced after twenty-two years from the laying of the keel, cruisers after eighteen years, destroyers after seventeen years, and submarines after fourteen years.

With regard to the financial arrangements for carrying out this great scheme, it appears to have been already decided that, though the present quinquennium does not close until 1917, fresh supplies shall be asked for the period 1916-1920. Presumably the Minister deems it advisable to appeal to the Duma for credits long beforehand.

Battle-ships.

The four battleships of the Gangut class, which are building at St. Petersburg, under the supervision of Messrs. John Brown & Co., have not been completed, but are expected to join the fleet next year. In the *Naval Annual* of 1913 was given a brief table of the new ships, which it is unnecessary to repeat here. The Borodinos are to be ready for service in 1916, as well as the Alexanders in the Black Sea. There, as in the Baltic, British energy, experience, and practical work have been sought. Work at the Russian shipbuilding yard, Nikolaieff, where the Alexander III. was launched on April 22, 1914, and the Imperatritza Maria, of the same class, on November 1st last year, is directed by Messrs. John Brown & Co., while the Nikolaieff works and shipyards, where the Ekaterina is in hand, are conducted in conjunction with Messrs. Vickers.

Battle-cruisers.

Of the four great battle-cruisers of the 1913 programme the keel plates of the Kinburn and Ismael were laid at the Baltic Yard, and of the Navarino and Borodino at the new Admiralty Yard, at the close of 1912, and they are advancing steadily. They are down for completion in 1915, and to join the Fleet in the following year. Displacement, 32,200 tons; length, 749 ft. 6 in.; beam, 99 ft. 6 in.; armament, twelve 14-in. guns in four triple turrets, and twenty-one 5·1-in guns; Yarrow boilers for coal and oil stoking, turbine engines of 66,000 H.P.; designed speed, 27 knots. All the propelling machinery will come from the Baltic Yard.

Cruisers.

At the end of 1913, the eight cruisers referred to above were laid

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down, six for the Baltic, and two smaller (designed for the Far East). The six vessels of the larger class, the Admiral Boutakoff and Admiral Spiridoff (Putiloff works, St. Petersburg), Admiral Greig and Svietlana (Russian Co., Reval), and Admiral Lazareff and Admiral Nachimoff (Nikolaieff), are to be completed in 1916. Displacement, 7600 tons; length, 519 ft. 9 in.; beam, 50 ft.; draught, 18 ft.; armament, sixteen 5·1-in. guns, five 9-pdr.; Curtis turbines, 55,000 H.P., speed 32 knots; 3-in. side armour and 1-in. deck. These particulars are not certain. The two smaller cruisers, Admiral Nevelskoi and Mouravieff-Amoursky, 4300 tons, are being built by Schichau at Elbing, and are to be completed this year. The last-named was launched April 11th. Length, 401 ft. 9 in.; beam, 46 ft.; draught, 16 ft. 6 in.; armament, eight 5·1-in., four 9-pdr., five 18-in. torpedo tubes; protection, 3-in. side armour and 1-in. deck; Schichau turbines of 27,400 H.P., 27·5 knots, maximum fuel 1000 tons.

The destroyer, Novik, 1200 tons, designed and built by the Vulcan Co., and fitted with turbines and boilers made by the company at Hamburg and Stettin, reached, on September 3rd, a mean speed of 37 knots. Her highest speed was 37·3 knots. For this success the Vulcan Co. has received a gold medal from the Russian War and Naval Technical Society. The Novik was built out of subscriptions raised by the National Committee, of which the Grand Duke Alexander Michailovitch was president. The same committee, which closed its labours and was dissolved in October, being warmly thanked by the Tzar, also raised money for the building of eighteen destroyers and four submarines. Destroyers.

Thirty-six destroyers of the Novik class, 1200 to 1300 tons, are provided for or building; and are to be completed, twelve each, in the years 1914, 1915 and 1916. They will mount three 4-in. and two machine guns, and will have five 18-in. double torpedo tubes. Turbines of 30,000 to 36,000 are to give a speed of 36 knots. These destroyers have received the names of officers or places. Eight are given out to the Putiloff works, St. Petersburg, five to the Reval Parvianin Works, nine to Herr Ziese's Co. (associated with Schichau), at Riga, six to the Russian Shipbuilding Co. at Reval, and eight to the St. Petersburg Metal Co.; but four or five may be taken over by the Vulcan Yard, Stettin, where the Novik was built.

Twelve large submarines are to be built for the Baltic, bearing the names of animals—Jaguar, Kuguar, Leopard, etc.—eight of them by Nobel and Lessner at St. Petersburg, and four at the Baltic Yard, St. Petersburg; the last were laid down in September. Six other boats are to be built by the Nevsky Yard for the Far East. Several Submarines.

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submarines, including the Nerpa, have been launched in the Black Sea.

The submarine salvage vessel Volchoft, built from designs of the Howaldt Yard, Kiel, and resembling the German Vulkan, was launched at the Putiloff Yard, St. Petersburg. Displacement, 2400 tons; length, 315 ft.; beam, 61 ft.; draught, 11 ft. 9 in.; lifting power, 1000 tons; Diesel engines; speed, 10 knots; range, 3000 miles. She carries supplies for submarines, including oil, fresh water, compressed air, and reserve accumulators.

The company of the submarine Minoga have been rewarded by the Tzar for their fine conduct on the occasion of the sinking of the vessel off Libau early in the year. The Minoga had twenty officers and men on board when she went down, owing, it is asserted, to a defective ventilator. A tender, exercising with her at the time, noticed that in diving she plunged rather suddenly, throwing her stern into the air, and her emergency buoy came to the surface. Telephonic communication was thus established, and ultimately, by means of chains fixed by divers, the Minoga was raised, having been submerged for nine hours. Everyone on board was rescued, although most of the crew were unconscious. This achievement constituted a record for submarine salvage work. It was favoured by the circumstance that the accident happened near a dockyard in comparatively shallow water, and in good weather; but the value of the emergency telephonic buoy was demonstrated.

The old battleship Tchesma, launched in 1886, being used as a target by the ships of the Black Sea Fleet, in order to test the resistance of her armour and bulkheads, was so badly damaged by shell fire that she foundered, and it was not found possible to raise her. The injury was caused by a 12-in. projectile, which entered slightly below the waterline almost amidships, making a clean hole through the 18-in. belt of compound armour.

Ordnance works.

In order to increase the resources for the supply of ordnance to the Navy, a contract was concluded between Messrs. Vickers and the Russian authorities, whereby the British firm received a concession to establish extensive gunworks, and a company, known as the Russian Artillery Works Company, with a capital of £1,500,000, has been formed. Tsaritsyn, an industrial town on the Volga, is the site for the works, and ordnance, projectiles, and other naval and military munitions will be manufactured there. The concession is for fifteen years; and the company, to which the Vickers firm will be technical advisers, will have the sole right, after the Russian Government's own works, to manufacture naval guns and field artillery.

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Great progress is being made in the Air Service, both for the Army and the Navy. The Government programme includes 330 aeroplanes, including ninety Sikorsky monoplanes and biplanes of ordinary sizes and ten giant Sikorsky machines of the Ilya Mourometys type, which carries about sixteen passengers. For small aeroplanes, other than those of the Sikorsky pattern, recourse will be had to foreign types, such as the Farman, Deperdussin, Morane-Saulnier, and Voisin. Two aeroplanes will be ordered from the German firm of Rumpler and two from the English firm of Sopwith, and two will be constructed on the system of the Russian Lieutenant Kowanko. Besides these aeroplanes, two dirigible airships will be ordered in France and one in Russia. The programme is to be completed without delay. Air service.

Admiral Prince Lieven, chief of the naval general staff, died suddenly in March, and was succeeded by Vice-Admiral Stetsenko.

UNITED STATES.

The last Report of Mr. Josephus Daniels, Secretary of the United States Navy, held up the high ideal of the Navy as "a great university with college extensions afloat and ashore"—every ship being a school, and every man having opportunities to improve his mind and fit himself for promotion. He gave the first place to the *personnel*, and said:—"Few know the splendid spirit of patriotism that animates them and the magnificent *esprit de corps* of the rank and file of the American Navy. It was never in such a high state of efficiency as to-day." The Secretary's view as to every ship being a school has met with some criticism, and one captain said before the Naval Committee of the House that the idea was impossible of realisation. If a ship was to be a fighting ship nothing should interfere with that object. Considerable feeling has been caused by the Secretary's order prohibiting the consumption of alcoholic liquors on board warships.

The Report also dealt with the increase in cost of battleships, and approved of a naval holiday, but not as a measure of proximate policy. "It is not a vacation that we need, but a permanent policy to guard against extravagant and needless expansions." Mr. Daniels also stated that armour, guns, and powder should be made by the Department, and showed the difficulty of securing real competition and reasonable prices from contractors. He said that the State could make armour more cheaply than it could buy it, and he recommends the creation of a Government arsenal. In the same line of argument, the Secretary, dealing with the oil question, and pointing out the

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advantages possessed by the United States in the possession of great oil-fields close to the Atlantic Ocean, Gulf of Mexico, and Pacific, said the Government could not escape the charge of wilful waste of public money if it continued to purchase oil at prices which might "fatten the pockets of a few oil companies," but which increased the burden for the taxpayer. The Department must, in the future, control its oil-wells and refine its own oil. In this connection Mr. Daniels outlined the policy adopted by Mr. Churchill.

Programme.

The shipbuilding programme approved by Congress last year provided for the building of one battleship (in a Government yard) at a cost not exceeding £1,485,000 (exclusive of armour and ordnance), six destroyers (£190,000 each), four submarines (together £495,787), one transport (£370,000), and one supply ship (£285,000). For the present year Mr. Daniels put forward a programme which he described as not large, but "progressive," and as meeting the demand to go forward in the creation of "an adequate and well-proportioned Navy"—two battleships, eight destroyers, and three submarines. The programme finally adopted by the Senate was for the building of two battleships (to cost not more than £1,626,000 each) six destroyers and eight submarines. The Navy General Board, looking to points of high strategy, and not to practical considerations or the temper of the House of Representatives, had, according to its custom, previously put forward a programme of four battleships (to replace the Indiana, Massachusetts, Oregon and Iowa, authorized in 1900–02), sixteen destroyers and a tender, eight submarines and a tender, and certain auxiliaries, including a hospital ship. The recommendations of the General Board were supported by a reasoned statement, which is instructive. They submitted, as the results of studies pursued since 1900, the following proportions of the various units needed for a complete fighting fleet:—

To eight battleships there should be thirty-two destroyers, sixteen submarines, one ammunition ship, two destroyer tenders, four fuel ships, one hospital ship, one repair ship, two submarine tenders, one supply ship, one transport. To these, with the present state of development, should be added at least sixteen aeroplanes. With these proportions, to carry out the policy in full, there would be required to be laid down each year, until the full fleet of forty-eight battleships was completed, four battleships, sixteen destroyers, eight submarines, eight aeroplanes, and six auxiliaries, the particular kind of auxiliaries to be laid down each year to be of the character to keep the auxiliary fleet in the proportions given above.

The Estimates (round figures) amount to £29,000,000, being a million less than on the last occasion; but the two battleships are included, the scheme being favoured by the House Committee on Naval Affairs, not opposed by the Democratic leader, supported by many representatives, and warmly advocated by President Wilson.

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BATTLESHIPS IN HAND.

Battle-ships.

—	—	Displacement.	Laid down.	Completion.
Texas . . .	Newport News .	27,000	April, 1911	Early, 1914
New York . .	New York . .	27,000	Sept., 1911	Early, 1914
Nevada . . .	Quincy . . .	27,500	May, 1912	January, 1915
Oklahoma . .	New York . .	27,500	May, 1912	January, 1915
Pennsylvania .	Newport News .	31,400	May, 1913	Early, 1916

The battleship Texas, 27,000 tons, provided for in 1910, has joined the fleet. She has four-cylinder triple-expansion engines for two screws, underwent trials in October, attaining a mean speed of 21·12 knots with 28,000 H.P., and a maximum speed of 22·3 knots. The sister-ship New York (Parsons turbines) is to be commissioned this summer.

The Oklahoma, 27,500 tons, was launched on March 23rd. She carries ten 14-in. and twenty-one 5-in. guns, has a designed speed of 20·5 knots, and is very heavily protected—13·5 in. at the water-line, and 16-in. and 18-in. armour on the turrets and conning tower.

The contract plans for battleship No. 39, a sister of the Pennsylvania, authorized by Congress, March 4, 1913, have been approved. The limit of cost, exclusive of armour and armament, is £1,485,000. This and the Pennsylvania are the largest battleships yet designed for the United States Navy. The vessel will be built at the Navy Yard, New York. The following are the characteristics: Length on water-line, 600 ft.; length over all, 608 ft.; beam, 97 ft.; draught, 28 ft. 10 in.; displacement, 31,400 tons. Speed on four-hours' trial, 21 knots. Armament: twelve 14-in. guns, twenty-two 5-in. guns, and four submerged torpedo tubes. The vessel will be driven by turbines, and fitted with oil-burning water-tube boilers.

The design of the two battleships authorized by Congress has been much discussed in the States, it being reported that the General Board favoured a radical advance in design. An armament of eight 16-in. guns and a speed of 25 knots have been spoken of, the design thus approximating to the new British types. Two factors much insisted upon are protection against submarine and aerial attack. An increase in displacement is considered inevitable, although some authorities have advocated reduced displacement for the purpose of securing three or four ships in one year instead of one or two. The General Board, in view of the 110-ft. width of the locks of the Panama Canal, have fixed the limit of the beam of the new ships at 100 ft.

No cruisers of any class are being built for the United States

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Navy, but Messrs. Cramp have in hand at Philadelphia a 12-knot gunboat, the Sacramento, 1500 tons, mounting three 4-in. and two 3-pdr. guns, which is to be completed this year.

De-stroyers. The 29·5-knot destroyer Parker, 1036 tons, attained a speed of 30·33 knots on her trials. She has Cramp-Zoelly turbines and reciprocating engines. The Duncan, of the same class, has been delivered. She carries four 4-in. guns and has four oil-fired Yarrow boilers and Curtis turbines. The mean speed of five runs on the measured mile was 29·86 knots, with 15,617 H.P., and the speed in the best run was 30·1 knots, with 15,356 H.P. The Henley, 742 tons (Curtis turbines), steamed at 30·3 knots, and the Jouett, of the same class (Parsons turbines), at 32·9 on a two-hours' forced draught trial. Six destroyers, of the same class as the Parker, about 1050 tons, are in hand, and provision is made for six more, 29½-knot boats (1913-14 programme), of which two will be built by the New York Shipbuilding Co., two by the Cramps, and one each by the Fore River Company and Bath Ironworks. The six boats of 1914–15 are not to exceed in cost £192,000 each.

Sub-marines. Four submarines were put in hand in December. The submarines K 1 and K 2 (521 tons submerged) recently underwent successful trials. They are the largest vessels of that class yet in the American service, and are oil-driven with two-cycle Diesel reversible engines. Previous submarines have had gasoline engines. Electric motors are provided operated by storage batteries. The boats are 165 ft. long, and the speeds are 14 knots (surface) and 11 knots (submerged). Some of the later boats will have 3-in. disappearing guns. The eight submarines of the 1914–15 programme are to be of three classes—one boat of large displacement and high speed for distant service, three for coast defence, and four of a small class, also for local service.

A contract has been placed for the construction of the submarine tender Bushnell, which will have comfortable living accommodation for the officers and crews of all the submarines; a completely equipped machine shop for repair work of all kinds, a special shop for the overhauling and adjustment of torpedoes, a large magazine for the stowage of a number of spare torpedoes for all the boats, large capacity for carrying ammunition, stores, food, clothing, and supplies of all kinds, including spare parts for the machinery of the submarines, and commodious hospital accommodation generally. The vessel will also be built with hauling gear at the bow, so designed as to be able to support the weight of a damaged submarine. There will also be facilities at the stern to permit of the raising out of the water the stern of a submarine, in oder to make repairs on

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BULGARIA.

At the close of the Balkan war some proposals were made for the building or purchase of four 400-ton destroyers, twelve 200-ton torpedo-boats, a tender and a monitor, but no practical steps have been taken.

CHILE.

The battleship Almirante Latorre was launched by Messrs. Armstrong, Whitworth & Co. on November 27th. The contract for her construction was signed in 1911, and her keel was laid in December of that year. She is the first of two sister-ships, which will be among the largest and most powerful battleships ever built in this country. The displacement is 28,000 tons, or 500 tons more than that of the British battleships of the Queen Elizabeth class. The Almirante Latorre and her sister, the Almirante Cochrane, were fully described in the *Naval Annual* last year. The report that one of the ships would be sold to Greece was officially denied.

The first pair of the six large ocean-going destroyers, which are being built by Messrs. J. S. White & Co., of East Cowes, Lynch and Condell, have been completed. They have a displacement of 1850 tons, Parsons turbine engines of 27,000 S.H.P., a speed of 31 knots, and an armament of six 4-in. guns and three Whitehead torpedo tubes. They are fitted to burn both oil and coal as fuel. The mean speed of the Lynch on trials was 31·7 knots, and on a six-hours' run 31·85 knots. Ths other vessels are the Goñi, Simpson, Robolledo, and Riveros.

CHINA.

The new Chinese Government is showing some activity in naval matters. It has been decided to establish a naval college at Nimrod Sound, Shanghai, and to increase the number of training-ships. Application was made to the British Government for the loan of officers for instructional purposes, and the services of Commander Harold Christian were obtained for a period of three years as director of the new college. Commander Christian has proceeded to the Far East, accompanied by other British naval instructors to be employed by the Chinese Government.

Three cruisers have been ordered to be built in Austria. The Kreditanstalt, the Laenderbank, and the Niederoesterreichische Eskompte-Gesellschaft having taken over £1,200,000 of Treasury

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bonds from the Chinese Government, with the principal object of financing the construction of the new vessels. They will be built by the Cantiere Navale at Monfalcone, with armaments of ten 3·9-in. guns, from the Skodawerke at Pilsen, and will have two torpedo tubes. With Yarrow boilers for mixed stoking and Parsons turbines of 30,000 H.P., they are to have a speed of 32 knots. The cruiser Fei-Hung, 2600 tons, built at Camden, N.J., has been sold to Greece.

Three destroyers, Cheng-Feng, Fu-Po, and Fei-Yun, built by Schichau at Elbing, have been delivered at Shanghai. They are fitted with triple-expansion engines, and steamed at 36·8 knots off Pillau. Seamen of the Schichau establishment navigated them through much bad weather from the Baltic to the Far East.

Denmark.

A coast-defence warship, the Niels Juel, sister of the Peder Skram, somewhat enlarged (3675 tons), was laid down at the end of last year at the Royal yard, Copenhagen.

The torpedo-boats and submarines mentioned last year are completed or completing, and one is being built out of a surplus from a fund raised by national subscription for the defence of Copenhagen. At the Royal yard the Neptun and Galathea were begun in December.

Greece.

Rear-Admiral Mark E. F. Kerr, with the function of Inspector-in-Chief, is acting as chief of the British naval mission to Greece, which is composed of officers on the active list of the Navy, lent for a period of two years. They have received executive authority in the Greek Navy, in which they hold superior rank, and they wear Greek uniform. Rear-Admiral Kerr's staff includes about three times as many members as that of Rear-Admiral Tufnell's mission, which returned home last year. At the request of the Greek Government, Colonel Sir Edward Raban, the late Director of Works and Civil Engineer-in-Chief at the Admiralty, was attached temporarily for special service.

On his arrival, Admiral Kerr was instructed to prepare a scheme of naval construction, and in the Chamber of Deputies, on March 19th, the Minister of Marine stated that the Government had approved a programme of naval construction in conformity with the new needs of the country. This programme includes two battle-cruisers of the Salamis class to be ordered from foreign yards, these being required to complete a fast armoured division with the Averoff and Salamis.

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The programme also provides for the building of two cruisers of 5000 tons of the type of the British Arethusa enlarged, as well as four destroyers, six submarines, and ten seaplanes.

The battleship Salamis (19,200 tons) is approaching completion at the Hamburg yard of the Vulcan Company.

The 22-knot cruiser built under the name of Fei-Hung for the Chinese Government at Camden, N.J., by the New York Shipbuilding Company, has been purchased. She displaces 2600 tons, and carries two 6-in., four 4-in. and 8 smaller Armstrong guns. The gunnery trials were successfully carried out by American officers under supervision of representatives of the Armstrong firm.

The six 125-ton torpedo-boats constructed at the Vulcan Yard have been named Daphni, Thetis, Aigli, Alkyone, Arethusa, and Doris.

The submarine Xiphias, built by the Schneider Company at St. Mandrier, made very satisfactory trials, and proceeded under her own power to the Piraeus.

In January, M. Venizelos assured the Greek Chamber that, despite the purchase of the Brazilian battleship by Turkey, Greece would remain mistress of the Ægean.

NETHERLANDS.

The Naval Budget for 1914 (£1,900,000) makes no provision for additional vessels, but only for the completion of the three armoured gunboats which are in course of construction at Amsterdam, and of two submarines, a submarine depôt ship, and eight destroyers, of which last the Panter steamed in her trials in January at 30 knots.

A Royal Commission, appointed to inquire into the defences of the Dutch Indies, reported in July. It proposed the establishment of a new fleet for the Netherlands and its Colonies, the latter as the principal means of defending the archipelago against direct attacks, and of maintaining neutrality. The Commission recommended that nine capital ships, each of 21,000 tons and 21 knots, should be built, of which five should be for the East Indies, supported by a strong torpedo flotilla. Six 36-knot torpedo-cruisers, 1200 tons, eight destroyers, forty-four torpedo-boats, and twenty-two submarines, would be divided for service between the Indies and Home waters. The principal base suggested for the fleet was Tanjong Priok, where three forts would be provided. The completion of the scheme would cover a period of several years, at an annual cost of about £3,790,000.

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Norway.

The two coast-defence vessels of 3400 tons, which Messrs. Armstrong, Whitworth & Co. are building at Elswick, have received the names of Nidaros and Bjoergvin.

The destroyer Garm, 550 tons, supplied with turbines from the Germania Yard, Kiel, is completing at Horten.

The Germania Yard is completing the fifth submarine, 220-255 tons.

The future programme includes the building of a mining vessel, the acquisition of aeroplanes, additional submarines, and the equipping of Horten Dockyard for submarine construction.

Portugal.

Nothing has been accomplished in the prosecution of the "large" Portuguese programme, and it is not possible to report progress with the "small" programme of two cruisers, 2500 tons, 20 knots, two 6-in., six 4-in., and smaller guns; six large destroyers, three submarines, 350 tons, and a submarine depôt and salvage ship of about 850 tons. The contract for these vessels was awarded provisionally to a syndicate composed of the firms of Messrs. John Brown & Co., Cammel Laird & Co., the Fairfield Shipbuilding and Engineering Co., Palmer's Shipbuilding and Iron Co., J. I. Thornycroft & Co., Ltd., and the Coventry Ordnance Works, with the Italian F.I.A.T.-San Giorgio Co., associated for the provision of the submarines. The whole question has since been submitted to a Portuguese Parliamentary Commission. Senhor Costa has declared that it would be better to have no navy than to leave the Portuguese Navy in its present condition.

Roumania.

Messrs. Pattison are building at Naples four big destroyers or torpedo cruisers of 1450 tons and 30 knots speed, mounting three 4·7-in. and seven 12-pdr. guns, two tubes. A Royal Commission recommends the building of twelve vessels of this class, six 3500-ton cruisers for the Black Sea, and twelve monitors of 600 tons and smaller vessels for the Danube. Mangalia, south of Konstanza, is to be made a naval base.

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SPAIN.

The first of the new battleships, the *España*, realised a speed of 20 knots during her six hours' run, or half a knot over the designed rate. The second ship, *Alfonso XIII.*, was launched May 7, 1913, and the third ship, the *Jaime I.*, is well advanced, and is to be completed in the summer of 1915. These vessels have all been built at the reconstructed Ferrol Arsenal, the work having been accomplished since the placing of the order three years ago with the Sociedad Española de Construccion Naval, which is also conducting the building of a number of lighter craft at Cartagena.

The Minister of Marine has declared that Spain will have her first division completed within two years. A further programme contemplates the building of three battleships of 21,000 tons, two cruisers of 3000 tons and 28 or 29 knots, six destroyers and eight 400-ton submarines. The King in his speech at the opening of the Cortes referred to the bringing forward of this programme.

The gunboat *Concha* was lost on the north coast of Morocco last June.

SWEDEN.

The situation of the Swedish naval defences has become latterly the cause of considerable anxiety and has led to a national crisis. The result of the manœuvres on the west coast in August gave renewed impetus to an agitation in favour of increased naval armaments. The peasantry, who have been accustomed for centuries to express their mind boldly in all important crises, organised a demonstration by a march *en masse* to Stockholm on February 6th, in order to inform the King that they were quite willing to bear the burden of increased defensive armaments, and that they considered that measures to this end should be taken without further delay. The King, answering the appeal of the representative of the 20,000 demonstrators, said: "Let us work together, and this important matter will find its solution. The generations that are past and the generations that are to come will hold us responsible for this our decision. May God help us not to fail in it." In consequence of this utterance, the Staaf Cabinet resigned, and a new Ministry was formed. Previously a programme of naval construction for the five years 1915–19 had been presented to the Riksdag by Admiral Lindman on behalf of the Opposition. It proposed the immediate laying down of three battleships of the *Sverige* type (the ship now being built by private subscription), also of two destroyers and three

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submarines, the cost to be covered by a vote of seven and a half million kronor (about £416,000) a year, in addition to the sums provided for the purpose in former Estimates. The plans of the new Government have not yet been disclosed. The actual estimates for 1915 amount to £1,510,000, and include no provision for the battleships mentioned.

The gunboat Urd was sunk in shallow water in collision with the Oden in August, and on January 28th the coast-defence ship Tapperheten ran aground when entering Sandhamn, and was much damaged.

TURKEY.

A noticeable feature of recent Ottoman naval policy has been the request for British assistance in the reorganisation of the Navy. Rear-Admiral A. H. Limpus, with a staff of British officers, has been lent to undertake the work. Still more remarkable was the purchase, at the end of December, of the Brazilian battleship Rio de Janeiro, now completing afloat by Messrs. Armstrong, Whitworth & Co., on the Tyne, which has been renamed Sultan Osman I. (Birindji Osman). The ship is to be completed this year, and should be in commission in July. The cost to Turkey is said to be nearer £3,000,000 than £2,000,000. The ship was fully described under "Brazil" in the *Naval Annual* last year. It is said that the Greeks were willing to purchase when the bargain with Turkey was closed. A third super-Dreadnought is to be built.

The Reshadieh, 23,000 tons, was launched by Messrs. Vickers at Barrow, September 3rd. In displacement, speed and heavy armament she resembles the King George V. class. Her keel was laid December 6, 1911, the order having been received by the syndicate constructing her—which is composed of the firms of Vickers, Armstrong, Whitworth & Co., and John Brown—in the previous August. The outbreak of the Balkan War caused a temporary stoppage of work.

On April 29th a contract was signed between the Ottoman Minister of Marine and this British group for the reorganisation of the Turkish dockyards. A concession is granted by which all the dockyards and naval arsenals, save those which may be constructed in future on the Red Sea and Persian Gulf, are to be reorganised, and the new company, which provides capital and technical knowledge, has the right to undertake private repairs. Administrative control is in British hands, and will remain so by the inclusion of five British and four Ottoman directors on the board. Turkish labour

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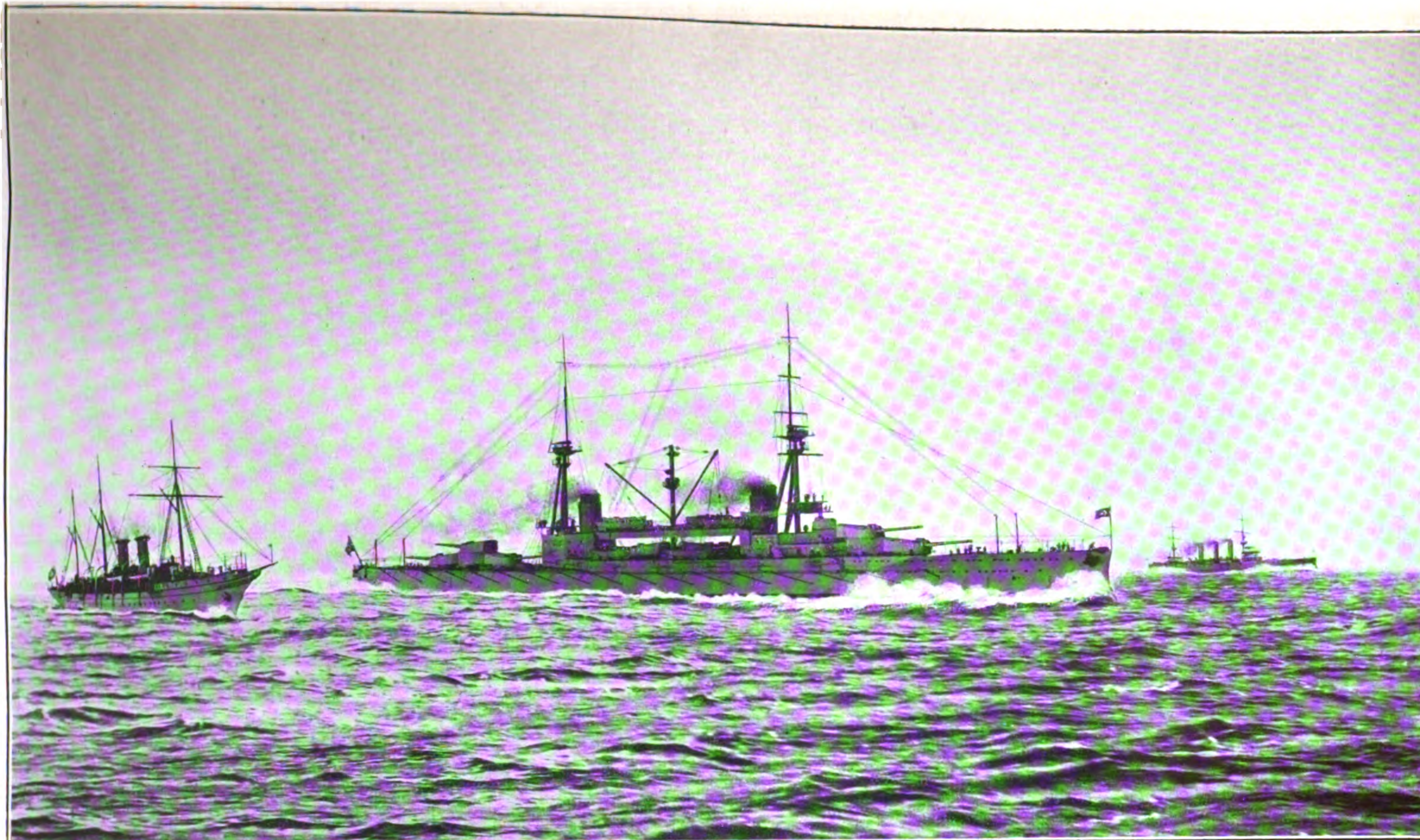

Imperial Yacht "Erthogroul." TURKISH BATTLESHIP "SULTAN OSMAN I." Imperial Cruiser "Hamidieh."

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is to be employed as far as possible, and special attention will be devoted to the training of men. No foreigners except British may be engaged. Two scouts are to be built on the Tyne. A floating dock for the Gulf of Ismid, capable of taking the largest ships, is included in the scheme. At that place a naval base is to be created. In case of war, the Turkish authorities will re-assume control of the establishments.

It has been officially announced that the British Admiralty have approved of certain naval pensioner ratings being lent for service under the Turkish Government.

Four powerful trawlers have been purchased in this country for patrolling the Dardanelles. They are said to be primarily for the use of the Customs service.

JOHN LEYLAND.

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CHAPTER III.

Comparative Strength.

During the year under review four battleships and two battle-cruisers (including the Australia) have been added to the naval strength of the British Empire. A fifth battleship will be in commission ere this volume is published. Three battleships and a battle-cruiser have been launched. For the German Navy three battleships and a battle-cruiser have been completed, and three battleships and two battle-cruisers launched. For the Austrian Navy one battleship has been completed and one launched, while no new ship has been laid down. For the Italian Navy two battleships have been completed and a third is approaching completion, while one battleship has been launched. Both Austria and Italy are feeling the strain on their national finances—the former owing to the situation in the Balkan Peninsula, the latter owing to the conquest of Tripoli, which still requires the maintenance of a large body of troops in the field. In both countries the commencement of the new programmes of construction which have been discussed has been deferred. For France two battleships have been completed, two others will be commissioned shortly, and three have been launched. For the Russian Navy no battleship has been completed. Four battleships which were launched in 1911 are expected to join the Fleet next year. The rate of construction, though improving, is still slow. For the United States one battleship has been completed, one is approaching completion, and one has been launched. For Japan one battle-cruiser has been completed and one battleship and three battle-cruisers launched. From the above summary it is clear that Germany, by steady adherence to her programme of construction, has again slightly improved her relative position as regards most other navies during the year. The position of France is improving; while we have no reason to be dissatisfied with the progress achieved by the British Navy.

In the table on the opposite page are given the Fleets in commission in the waters of Northern Europe. The First and Second Squadrons of the British First Home Fleet have been brought up to full strength during the year, and consist entirely of Dreadnoughts.

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CLASS.	GREAT BRITAIN.			GERMANY.		RUSSIA.
	HOME FLEETS.			HIGH SEA FLEET.		BALTIC FLEET.
	FIRST FLEET.		SECOND FLEET.			
	IRON DUKE (Fleet Flagship).			FRIEDRICH DER GROSSE (Fleet Flagship).		
BATTLESHIPS . .	*1st Squadron.* Collingwood Colossus Hercules Neptune St. Vincent Superb Temeraire Vanguard	*2nd Squadron.* Ajax Audacious Centurion Conqueror King George V. Monarch Orion Thunderer	*5th Squadron.* Queen Prince of Wales Bulwark Formidable Implacable Irresistible London Venerable	*1st Squadron.* Ostfriesland Thüringen Helgoland Oldenburg Nassau Rheinland Posen Westfalen	*3rd Squadron.* Kaiser Kaiserin König Albert Prinz Regent Luitpold	Andrei Pervozvannyi Imp. Pavel Cesarevitch Slava
	3rd Squadron. Edward VII. Africa Britannic Commonwealth Dominion Hibernia Hindustan Zealandia	*4th Squadron.* Dreadnought Bellerophon Agamemnon	*6th Squadron.* Lord Nelson Russell Cornwallis Albemarle Duncan Exmouth Vengeance.	*2nd Squadron.* Preussen Schleswig-Holstein Pommern Hannover Hessen Schlesien Lothringen Deutschland	*Reserve Squadron.* Wittelsbach Braunschweig Elsass Zähringen	
CRUISERS. . .	*1st Battle Cruiser Squadron.* Lion Queen Mary New Zealand Princess Royal	*2nd Squadron.* Shannon Achilles Cochrane Natal	*5th Squadron.* Carnarvon Bristol Falmouth Liverpool	*Battle Cruisers.* Seydlitz Goeben Von der Tann Moltke		Rurik Gromoboi Ad. Makaroff Bayan Pallada
	3rd Squadron. Antrim Argyll Devonshire Roxburgh	*4th Squadron.* Suffolk Berwick Essex Lancaster Hermione	*6th Squadron.* Drake Good Hope King Alfred Sutlej (*tempy.*)			
LIGHT CRUISERS .	8		2	8		

The Third Squadron has also been brought up to strength, and consists, as last year, of the King Edward class. The Fourth Squadron comprises the Dreadnought, Agamemnon, and Lord Nelson. The First Fleet includes the First Battle-Cruiser Squadron, three Cruiser Squadrons, and the First Light-Cruiser Squadron, besides four light cruisers and eight attached destroyers. Four destroyer-flotillas —three of which consist of twenty and one of ten destroyers—each flotilla with its flotilla-cruiser and depot-ship, are also comprised in the First Fleet. The completion of the Queen Mary and New Zealand has enabled the Indefatigable and Indomitable to be transferred from the First to the Second Battle-Cruiser Squadron in the Mediterranean. The Second Fleet includes the Fifth and Sixth Battle Squadrons, the Fifth and Sixth Cruiser Squadrons, four destroyer flotillas, and seven flotillas of submarines. The Fifth Battle Squadron consists of the same ships as last year. The Sixth Battle Squadron, which was represented last year by the Vengeance, now includes also the Lord Nelson and five Duncans, most of which are employed in training-duties at Home ports. The Third Fleet comprises the fourteen oldest battleships, viz., nine Majestics and five Albions, besides a number of cruisers of the Drake, Cressy, and other older classes organised in five squadrons.

The First and Second Squadrons of the German High Sea Fleet comprise the same ships as last year. The First Squadron consists of all-big-gun ships. The ships most recently completed have been placed in the Third Squadron, which comprises four ships instead of eight as intended. The Battle-Cruiser Squadron has been brought up to full strength by the completion of the Seydlitz.

We have forty-three battleships in commission in the First and Second Home Fleets as compared with thirty-nine battleships last year. The Germans have twenty-five battleships in commission as compared with twenty-four. Of modern battleships we have twenty-one in commission and Germany thirteen—viz., two and a half squadrons to Germany's one and a half squadrons. The British Third Squadron is much more powerful than the German Second Squadron. The ships of the British Fifth and Sixth Squadrons are more powerful than most of the ships which Germany has in reserve. This comparison of the Fleets of the two Powers in Northern Europe shows that we are maintaining quite enough battleships in commission, and that the number of older battleships in commission could be reduced without danger to the national security.

The Russian Baltic Fleet comprises the same ships as last year. With the completion of the Gangut class, at the end of this year or early next, it will become a force which Germany cannot ignore.

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The strength of the Fleets regularly in commission in the Mediterranean is given in the table below:— Mediterranean

	Britain.	*France.*	*Italy.*	*Austria.*
	Battle-Cruisers.	1st Squadron.	1st Squadron.	1st Squadron.
Battle-ships	Inflexible	Courbet	Dante	Viribus Unitis
	Indefatigable	Jean Bart	Leonardo da Vinci	Tegetthoff
	Indomitable	Condorcet	Giulio Cesare	Radetzky
	Invincible*	Danton		Zrinyi
		Diderot	2nd Squadron.	
		Mirabeau	Regina Elena	Reserve.
		Vergniaud	Vittorio Emanuele III.	Erz. Franz Ferdinand
		Voltaire		Erz. Friedrich
			Roma	Erz. Ferdinand Max
		2nd Squadron.	Napoli	
		Patrie		
		Démocratie	Training Squadron.	
		Justice		
		République	Reg. Margherita	
		Vérité	Benedetto Brin	
			Emanuele Filiberto	
		Reserve Ships.		
		Bouvet		
		Gaulois		
		St. Louis		
			1st Squadron.	
Armoured Cruisers	Defence	Waldeck Rousseau	Garibaldi	
	Black Prince	Edgard Quinet	Varese	
	Duke of Edinburgh	Ernest Renan	Ferruccio	
	Warrior	Jules Ferry	2nd Squadron.	
		Léon Gambetta	Pisa	
		Victor Hugo	Amalfi	
			San Giorgio	
Light Cruisers	4	3	5	

* Undergoing refit.

The concentration of the whole of the French battleship strength in the Mediterranean, a policy which, as set out in the previous chapter, has powerful critics, gives France a great preponderance. Though Italy and Austria have at the moment five all-big-gun ships completed to two for France, the French Fleet could probably hold its own against the fleets of the other two Powers combined. The effectiveness of the Austrian Fleet for war is discounted by the fact that Austria has practically no cruisers.

During the Balkan War the Third Squadron of the Home Fleet was sent temporarily to the Mediterranean. During the past winter the First and Second Squadrons have visited the Mediterranean in succession and taken part in manœuvres there. It is to be hoped that this practice will be continued, at any rate until a Mediterranean Battle Squadron is reconstituted. We have repeatedly urged in these pages that to keep so large a proportion of our strength in battleships and cruisers tied to Home ports throughout the year is foreign to the traditions of the Naval Service and destructive of efficiency. In the

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winter months the ships are much better abroad, where training and drill can be carried on.

In his speech introducing the Navy Estimates on March 18th last, the First Lord stated that so long ago as July, 1912, the Cabinet had decided that a British Battle Squadron should be maintained in the Mediterranean, and that we could not afford to leave our interests there indefinitely to the care of cruiser-squadrons and flotillas. By the end of 1915 it is intended that the Mediterranean Fleet shall comprise eight battleships (in place of the four battle-cruisers) and the four armoured cruisers, four light cruisers of the "Town" class, and sixteen destroyers which are now on the station. In order to carry out this decision—the three Canadian ships having failed—three ships of the 1913–14 programme were laid down eight or nine months earlier than was originally proposed. The decision of the Government to reconstitute a Battle Squadron in the Mediterranean is most welcome.

Atlantic. United States. The United States Atlantic Fleet comprises the same ships as last year, with the exception of the Texas, organised in four divisions of five ships each with a Fleet flagship. Like the Austrian Battle Fleet, it is without cruisers. With the completion of the Panama Canal it will no longer be confined to the Atlantic, but, according to the Secretary of State, will pass part of the year in Pacific waters.

It is satisfactory to note that the suggestion we made last year has been adopted. The Fourth Cruiser Squadron has been detached for service in the West Atlantic. During the recent troubles in Mexico the ships of the squadron have been distributed at various ports, and the respect accorded to the British flag has enabled its officers to be of invaluable assistance in the rescue of refugees, including many United States citizens. The opening of the Panama Canal, and the increased importance which Jamaica and our other West Indian colonies will thereby acquire, renders it most desirable that the British flag should be well represented in those waters during the winter months.

Cape. On the Cape station we have only the Hyacinth and two small cruisers. A powerful cruiser is badly needed on this important station.

Pacific. On the Pacific coast the United States have in commission a squadron of four armoured cruisers, as last year, and in reserve an old battleship, five armoured cruisers and three smaller cruisers. The British flag is only represented by two sloops and the Rainbow of the Canadian Navy.

Eastern waters. The Japanese Fleet in commission is organised as follows:—

1st Squadron.—Battleships Shikishima, Kawachi, Settsu, **Kashima**; armoured cruisers: Kurama, Ibuki.

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2ND SQUADRON.—Armoured cruiser Idzumo, and three light cruisers.
3RD SQUADRON.—Armoured cruiser Iwate and six light cruisers.
TRAINING SQUADRON.—Armoured cruisers Adzuma and Asama.

The following is a list of the ships of other naval Powers in commission in Eastern waters:—

	Britain.	*Germany.*	*France.*	*United States.*
BATTLESHIPS . . .	Swiftsure (E.I.)			
BATTLE-CRUISERS .	Australia (R.A.N.)			
ARMOURED CRUISERS	Minotaur.	Gneisenau.	Montcalm.	Saratoga.
	Hampshire.	Scharnhorst	Dupleix.	
LIGHT CRUISERS	Dartmouth (E.I.)	Leipzig.		Albany.
	Newcastle.	Emden.		Cincinnati
	Yarmouth	Nürnberg.		
	Melbourne (R.A.N.)			
	Sydney (R.A.N.)			
	Encounter (R.A.N.)			

E.I. = East Indies. R.A.N. = Royal Australian Navy.

In addition to the ships in the above list we have two small cruisers in commission in the East Indies and three in New Zealand. There are no less than ten sloops and gunboats in commission in the East Indies and China. The strength of the China Squadron has been reduced by this substitution of two light for two armoured cruisers. As a compensation the battleship Triumph, sister-ship to the Swiftsure, has been sent to Hong Kong in reserve. She is a suitable vessel for employment in those waters, and presumably a crew could be made up for her in case of emergency from the sloops and gunboats on the station which would be valueless in war. Having regard to our enormous interests in the Far East it is certainly desirable that the British China Squadron should be strengthened. The French have withdrawn one armoured cruiser from Eastern waters. The German and United States Squadrons remain the same as last year.

Australia.

The altered circumstances of the naval defence of Australasia are discussed in the first chapter. The Royal Australian Navy, under the command of Rear-Admiral Patey, is now in being, and the first unit, consisting of a battle-cruiser and three light cruisers, will shortly be complete. There is considerable disappointment both in Australia and New Zealand at the failure of the Mother Country to carry out the scheme for creating similar units in the East Indies and China. Australians and New Zealanders are naturally much pre-occupied by the naval situation in the Pacific. It is true that the Japanese alliance has been renewed till 1921, but the policy of that alliance is questioned, not only in Australasia but elsewhere. It is true that the combined British Squadrons in Eastern waters are considerably more powerful than those maintained by any other Power, excepting Japan, but the interests we have at stake are immeasurably superior to theirs. It is regrettable that the battle-cruiser New

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Zealand was not sent, as originally intended, to the Far East, and that a modern cruiser was not sent, as desired by the Dominion Government, to New Zealand. The whole question of naval defence in the Pacific will require serious consideration in the near future, and if we wish to keep the British Empire together it is most desirable that the proposal made last year by the First Lord should be carried out, and that the Overseas Dominions should be visited from time to time by a squadron of the Royal Navy.

Comparative Tables.

The Comparative Tables are on the same lines as last year. There have been struck off the list of battleships two French, two Russian and three United States ships, which are all over 20 years old. The present position as regards battleships of all classes, including battle-cruisers, is as follows:—

	Britain.	Germany.	Austria.	Italy.	France.	Russia.	U.S.	Japan.
Built . .	68	37	11	11	21	8	31	16
Building .	14	11	2	4	10	11	5	4
Total .	82	48	13	15	31	19	36	20

In completed battleships of all classes the British Navy is still equal to those of Germany and the United States—the next two strongest naval Powers—combined. Included in the totals of the three navies are a large proportion of pre-Dreadnought battleships, viz., Britain 38, Germany 20, and the United States 20.

Forecast.

A forecast of the relative position as regards modern battleships and battle-cruisers at the end of 1914 and two following years is given in the table below:—

	Britain.	Germany.	Austria.	Italy.	France.	Russia.	U.S.	Japan.
1914 (end)	34	21	3	4	10	6	10	
1915 (to be completed) .	7	2	1	2	3	1	2	
1915 (end)	41	23	4	6	13	7	12	
1916 (to be completed) .	5	3	–	–	4	1	2	
1916 (end)	46	26	4	6	17	8	14	

The forecast of the British Navy is based on the completion before the end of the current year of the Marlborough, Empress of India, Benbow, and Tiger; in 1915, of the battleships Queen Elizabeth, Warspite, Barham, Valiant, Malaya, and two Royal Sovereigns; in 1916, of three Royal Sovereigns and two of the ships to be laid down this year. For the German Navy it is probable that, on the average, three battleships or battle-cruisers will be completed each year. Before the end of the current year, three battleships and the battle-cruiser Derfflinger should be completed; in 1915, the battle-

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ship Kronprinz and the battle-cruiser Lützow; in 1916, the battleships Ersatz Wörth and T and the battle-cruiser Ersatz Hertha should be ready for sea. The Austrian and Italian Navies are both feeling the effect of financial stringency. The new programmes of both navies include four battleships, and it is improbable that any ships will be laid down in time to be completed in 1916. The rate of construction in the French Navy has been so much improved that it seems safe to estimate that three battleships will be completed in 1915 and four in 1916. In Russia, on the other hand, the rate of construction is still very slow. It is doubtful whether the four Ganguts will be completed as estimated by the end of the current year, and unless the British assistance which has been invoked for the shipbuilding yards leads to a great improvement in construction, it is unlikely that more than one battleship will be completed in 1915, and two in 1916, all for the Black Sea. The forecast shows that the position of the British Navy in modern ships will remain satisfactory for the next three years.

At the end of 1915 we shall have forty-one modern battleships, as compared with twenty-three for Germany, and thirty-three for the Triple Alliance. At the end of 1916 we should have forty-six ships completed, Germany twenty-six, and the Triple Alliance thirty-six, though it is possible that Austrian ships laid down this year may be completed in 1916. At the end of both years it should be noted that the strength of the Franco-Russian Alliance in this class of ship will nearly equal that of Germany. It is clear from this survey that, as the result of the heavy expenditure on new construction during recent years, the present position and the position in the immediate future of the British Navy have materially improved since last year.

To those who constantly urge that the British Fleet should be equal to those of the Triple Alliance, it may be observed (1) that it is impossible to contemplate England being involved in war with Italy except through our own fault. The friendship of England is still, in spite of the efforts of the Yellow Press, too highly prized in Italy for the Italian Navy to be used in an attack upon this country. (2) It is certain that England could not be engaged in a war with the Triple Alliance without France and Russia also being involved. The balance of power is well preserved in Europe now, and England is holding her own. It would be a grave blunder to depart from our traditional policy and to commit ourselves, as suggested by Lord Esher and others, to an alliance with France and Russia against Germany, Austria, and Italy.

In the cruiser classes we have a great superiority, but certainly not Cruisers.

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greater than is needed for the protection of our enormous oversea trade. From the list of British first-class or armoured cruisers four Diadems have been struck out, the Niobe is in Canada, and the three other ships of the class must shortly disappear. At the present we have thirty-eight armoured cruisers; Germany nine; France, who for several years concentrated her shipbuilding efforts on this type of ship, eighteen, and the United States fifteen. With the advent of the battle-cruiser the value of the armoured cruiser was at once called into question. No armoured cruisers are now being built for any navy, and there is no prospect that any will be laid down. The first-class cruiser carries an infinitely more powerful armament than the cruisers now being built for our own and other navies. The latter have a great advantage in speed, but in many cases the armament carried is so weak that it is doubtful whether they could fight with success a well-armed merchantman. Our superiority in armoured cruisers would be of value in case of war.

Light cruisers.

The Light Cruiser table includes vessels previously classed as second and third class cruisers, the space indicating the division between the two classes. Scouts under 2000 tons, *e.g.*, the Italian Agordat, are not included. For the British Navy five light cruisers have been completed, eight have been laid down, while nine old cruisers of the Naval Defence Act and P classes have been struck out. Four light cruisers are included in the programme for the current year. For the German Navy, as usual, two light cruisers have been completed, and two laid down, while three are struck off the list. Included in the Italian and French lists are several old cruisers which can hardly be considered effective for war purposes. The Libia has been removed from the Italian list as she will probably be handed over to Turkey, for whom she was being built at the time of the war. Six cruisers of 7600 tons, which are much more powerful than any other ships included in this table, are being laid down for the Russian Navy. We have seventy-two light cruisers completed and seventeen building, as compared with thirty-nine built and six building for Germany. Our position as regards light cruisers is not satisfactory. The vessels of this class recently laid down for the British Navy, viz., the Arethusa and Calliope classes, are much smaller than the Bristol and her successors. They have an advantage of about 3 knots in speed, but the armament is reduced from eight 6-in. to two 6-in. and eight 4-in. guns. The latter is a respectable armament for the displacement, but it does not seem powerful enough for dealing with a merchant cruiser. A smaller number of the Birmingham class would have been a more valuable addition to the Navy.

From the foregoing review of the strength of the various navies

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and of the programmes of construction in hand, it may be fairly concluded that the position of the British Navy relatively to that of other Powers is being well maintained. It has, in fact, improved during the year under review. The present Board of Admiralty are carrying out the pledges of the First Lord for which he has had to fight so strenuously. The large expenditure on new construction and the heavy increase in the charges for maintenance and for manning have thrown a very heavy burden on the taxpayers of the Mother Country. That burden is in the first instance imposed on the shoulders of the few. In reality it will be most felt by the many, and constitutes a great drain on the resources of the Mother Country—too great a drain in time of peace. If Canada had played the part which Mr. Borden and his colleagues desired, some of the heavy increase in taxation about to be imposed would have been avoided. It is not reasonable that Canada should be defended at the expense of people who are being taxed out of their homes. As pointed out in Chapter I. the time is rapidly approaching when the part which the Mother Country and the Oversea Dominions are respectively to take in the defence of the Empire will have to be reconsidered.

HYTHE.

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Table I.—Modern Battleships.

GREAT BRITAIN.

Launched.	Name.	Displacement.
		tons.
	Royal Sovereign	
	Royal Oak ...	‡
	Revenge	25,750
	Resolution ...	
	Ramilies	
	Malaya	
	Barham	‡
1913	*Queen Elizabeth*	27,500
1913	*Warspite*	
	Valiant	
1912	Iron Duke ...	‡
1912	*Marlborough* ...	25,000
1913	*Emperor of India*	
1913	*Benbow*	
1911	King George V.	
1912	Ajax	23,000
1912	Audacious ...	
1911	Centurion ...	
1911	Conqueror ...	
1911	Monarch	22,500
1911	Thunderer ...	
1910	Orion	
1910	Colossus	20,000
1910	Hercules	
1909	Neptune	19,900
1908	Collingwood ...	
1908	St. Vincent ...	19,250
1909	Vanguard ...	
1907	Bellerophon ...	
1907	Temeraire ...	18,600
1907	Superb	
1906	Dreadnought ..	17,900
1906	Lord Nelson ...	16,500
1906	Agamemnon ...	
	31 ships.*	772,600

GERMANY.

Launched.	Name	Displacement.
		tons.
	Ers. K. Fried. III.	‡ 29,000
	Ers. Worth T	
1914	*Kronprinz* ...	
1913	*Grosser Kurfürst*	
1913	*Markgraf* ...	26,575
1913	*Konig*	
1911	Kaiserin	
1912	Konig Albert ...	
1912	Prinz Luitpold	24,310
1911	Friedrich der Grosse	
1911	Kaiser	
1910	Oldenburg ...	
1909	Thuringen ...	
1909	Ostfriesland ...	22,500
1909	Helgoland ...	
1908	Posen	
1908	Rheinland ...	18,600
1908	Nassau	
1908	Westfalen ...	
	20 ships.	479,250

AUSTRIA-HUNGARY.

Launched.	Name.	Displacement.
		tons.
1911	Viribus Unitis...	
1912	*Prinz Eugen* ...	20,000
	Szent Istvan ...	
1912	Tegetthoff ...	
	4 ships.	80,000

ITALY.

Launched.	Name.	Displacement.
		tons.‡
	G.	28,000
1913	*Doria*	23,025
1913	*Duilio*	
1911	*Conte di Cavour*	
1911	Giulio Cesare ...	22,340
1911	Leonardo da Vinci	
1910	Dante Alighieri	19,400
	7 ships.†	160,470

FRANCE.

Launched.	Name.	Displacement.
		tons.
	Béarn	
	Languedoc ...	
	Flandre	24,830
	Gascogne	
	Normandie ...	
1913	*Bretagne*	
1913	*Lorraine*	23,177
1913	*Provence*	
1912	*France*	
1912	*Paris*	23,100
1911	Courbet	
1911	Jean Bart... ...	
1909	Danton	
1909	Condorcet ...	
1909	Diderot	18,028
1909	Mirabeau... ...	
1910	Vergniaud ...	
1909	Voltaire	
	18 ships.	294,249

RUSSIA.

Launched.	Name.	Displacement.
		tons.
	Ekaterina II.§	
1914	*Alexander III.*§	22,500
1913	*Imperatritsa*§ *Maria*	
1911	*Sevastopol* ...	
1911	*Petropavlosk* ...	23,000
1911	*Gangut*	
1911	*Poltava*	
1907	Imperator Pavel I.	17,400
1906	Andrei Pervozvannyi ...	
	9 ships.	194,300

UNITED STATES.

Launched.	Name.	Displacement.
		tons.
	Arizona ~~No. 39~~	31,400
	Pennsylvania...	
	Nevada	27,500
1914	*Oklahoma* ...	
1912	*New York* ...	27,000
1912	Texas	
1911	Wyoming... ...	26,000
1911	Arkansas	
1910	Florida	21,825
1909	Utah	
1909	Delaware	20,000
1908	North Dakota ...	
1908	Michigan	16,000
1908	South Carolina	
	14 ships.**	339,450

* Four projected. † Three projected. ‡ Doubtful. § Black Sea. ** Two projected.

Table II.—Battle-Cruisers.

GREAT BRITAIN.

Ld.	Name.	Tons.
1913	*Tiger*...	28,000†
1912	Queen Mary ...	27,000
1911	Princess Royal	26,350
1910	Lion	
1911	New Zealand ...	18,800
1911	Australia* ...	
1909	Indefatigable ...	18,750
1907	Indomitable ...	
1907	Inflexible	17,250
1907	Invincible	
	10 ships.	215,800

GERMANY.

Ld.	Name.	Tons.
	Ers. Vict. Luise	†
	Ers. Hertha ...	30,000
1913	*Derfflinger* ...	
1913	*Lützow*	†
1912	Seydlitz	24,640
1911	Goeben	22,640
1910	Moltke	
1909	Von der Tann...	18,700
	8 ships.	208,620

RUSSIA.

Ld.	Name.	Tons.
	Borodino	†
	Ismail	32,200
	Navarin	
	Kinburn	
	4 ships.	128,800

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TABLE III.—OLDER BATTLESHIPS.

GREAT BRITAIN.

Launched.	Name.	Displacement.
		tons.
1903	Edward VII.	
1903	Commonwealth	
1903	Dominion	
1903	Hindustan	16,350
1904	Zealandia	
1905	Africa	
1904	Britannia	
1905	Hibernia	
1903	Swiftsure	11,800
1903	Triumph	
1902	Queen	15,000
1902	Prince of Wales	
1901	Albemarle	
1901	Cornwallis	
1901	Duncan	14,000
1901	Exmouth	
1901	Russell	
1898	Formidable	
1898	Irresistible	
1899	Implacable	15,000
1899	London	
1899	Venerable	
1899	Bulwark	
1897	Canopus	
1899	Glory	
1898	Albion	12,950
1898	Goliath	
1898	Ocean	
1899	Vengeance	
1894	Magnificent	
1895	Majestic	
1895	Prince George	
1895	Victorious	
1896	Cæsar	14,900
1896	Hannibal	
1896	Illustrious	
1895	Jupiter	
1896	Mars	
	38 ships.	556,200

GERMANY.

Launched.	Name.	Displacement.
		tons.
1904	Deutschland	
1905	Hannover	
1905	Pommern	13,040
1906	Schlesien	
1906	Schleswig-Holstein	
1902	Braunschweig	
1903	Elsass	
1903	Hessen	12,997
1903	Preussen	
1904	Lothringen	
1900	Wittelsbach	
1901	Wettin	
1901	Zahringen	11,643
1901	Mecklenburg	
1901	Schwaben	
1896	Kaiser Friedrich III.	
1897	Kaiser Wilhelm II	
1899	Kaiser Wilhelm der Grosse	10,974
1900	Kaiser Barbarossa	
1899	Kaiser Karl der Grosse	
	20 ships.	243,270

AUSTRIA-HUNGARY.

Launched	Name.	Displacement.
		tons.
1908	Erz. Franz Ferdinand	14,226
1909	Radetzky	
1910	Zrinyi	
1904	Erz. Friedrich	
1903	Erz. Karl	10,433
1905	Ferdinand Max	
1901	Arpád	
1902	Babenberg	8,208
1900	Habsburg	
	9 ships.	98,601

ITALY.

Launched.	Name.	Displacement.
		tons.
1904	Regina Elena	
1904	Emanuele III.	12,425
1907	Roma	
1905	Napoli	
1901	Ra Margherita	13,214
1901	Benedetto Brin	
1897	E. Filiberto	9,645
1897	Saint Bon	
	8 ships.	95,418

FRANCE.

Launched.	Name.	Displacement.
		tons.
1903	Patrie	
1902	République	
1904	Justice	14,635
1907	Vérité	
1904	Démocratie	
1899	Suffren	12,527
1896	Bouvet	12,007
1895	Masséna	11,735
1896	St. Louis	11,090
1896	Gaulois	11,105
1895	Charlemagne	11,108
1894	Carnot	11,954
1899	Henri IV.	8,807
	13 ships.	163,508

RUSSIA.

Launched.	Name.	Displacement.
		tons.
1906	Ioann Zlatoust§	12,733
1906	Evstafi§	
1903	Slava	13,516
1901	Cesarevitch	12,912
1900	Panteleimon§	12,582
1893	Tria Sviatitelia§	13,318
	6 ships.	77,794

UNITED STATES.

Launched.	Name.	Displacement.
		tons.
1905	Idaho	13,000
1905	Mississippi	
1904	Connecticut	
1905	Kansas	
1904	Louisiana	16,000
1905	Minnesota	
1906	New Hampshire	
1905	Vermont	
1904	Georgia	
1904	Nebraska	
1904	New Jersey	14,948
1904	Rhode Island	
1904	Virginia	
1901	Ohio	12,440
1901	Maine	12,300
1901	Missouri	
1898	Wisconsin	11,653
1898	Alabama	11,565
1898	Illinois	
1898	Kearsarge	11,540
1898	Kentucky	
1896	Iowa	11,340
	22 ships.	302,983

§ Black Sea.

Table IV.—First-Class Cruisers.

GREAT BRITAIN.

Speed.	Name.	Displacement.
kts.		tons.
22½	Minotaur... ...	
22½	Shannon	14,600
22½	Defence	
23	Duke of Edinburgh	
23	Black Prince ...	
23	Achilles	13,550
23	Cochrane	
23	Natal	
23	Warrior	
22½	Devonshire ...	
22½	Antrim	
22½	Argyll	10,850
22½	Carnarvon ...	
22½	Hampshire ...	
22½	Roxburgh ...	
23	Monmouth ...	
23	Kent	
23	Essex	
23	Berwick	
23	Cornwall	9,800
23	Cumberland ...	
23	Donegal	
23	Lancaster ...	
23	Suffolk	
23	Drake	
23	Good Hope ...	14,100
23	King Alfred ...	
23	Leviathan ...	
21	Aboukir	
21	Bacchante ...	
21	Cressy	12,000
21	Euryalus	
21	Hogue	
21	Sutlej	
20½	Amphitrite* ...	11,000
20½	Argonaut* ...	
20½	Europa*	11,000
20½	Niobe*†	
	38 ships.	4[illegible]

GERMANY.

Speed.	Name.	Displacement.
kts.		tons.
23	Blücher	15,550
22½	Scharnhorst ...	11,420
22½	Gneisenau ...	
21	Roon...	9,350
21	Yorck	
20½	Prinz Adalbert	8,858
20½	Friedrich Karl...	
20½	Prinz Heinrich	8,759
19	Fürst Bismarck	10,570
	9 ships.	94,135

AUSTRIA-HUNGARY.

Speed.	Name.	Displacement.
kts.		tons.
22	St. Georg	7,185
	1 ship.	7,185

ITALY.

Speed.	Name.	Displacement.
kts.		tons.
22½	Amalfi	9,956
22½	Pisa	
22½	San Giorgio ...	9,832
22½	San Marco ...	
20	Giuseppe Garibaldi	
20	Varese	7,294
20	F. Ferruccio ...	
20	Carlo Alberto ...	6,396
20	Vettor Pisani ...	
	9 ships.	71,250

FRANCE.

Speed.	Name.	Displacement.
kts		tons.
23	Edgard Quinet	13,780
23	Waldeck-Rousseau ...	
23	Ernest Renan...	13,427
23	Jules Michelet	12,370
22	Léon Gambetta	
22	Jules Ferry ...	12,351
22	Victor Hugo ...	
21	Condé	
21	Gloire	
21	Marseillaise ...	9,856
21	Amiral Aube ...	
21	Gueydon	
21	Montcalm ..	9,367
21	Dupetit Thouars	
21	Jeanne d'Arc...	11,092
21	Desaix	
21	Dupleix	7,578
21	Kleber	
	18 ships.	191,761

RUSSIA.

Speed.	Name.	Displacement.
kts.		tons.
21	Rurik	15,170
22	Adm. Makaroff	
21	Bayan	7,900
21	Pallada	
20	Gromoboi	13,220
20	Rossia	12,130
	6 ships.	64,220

UNITED STATES.

Speed.	Name.	Displacement.
kts.		tons.
22	Washington ...	
22	Tennessee ...	14,500
22	Montana	
22	North Carolina	
22	St. Louis	
22	Charleston ..	9,700
22	Milwaukee ...	
22	West Virginia	
22	California ...	
22	Colorado	13,680
22	Maryland... ...	
22	Pittsburg... ...	
22	South Dakota...	
21	Saratoga	8,200
21	Brooklyn	9,215
	15 ships.	186,595

TABLE V.—LIGHT CRUISERS.

GREAT BRITAIN.

Speed.	Name.	Displacement.
kts.		tons.
29*	*Calliope*	
29*	*Conquest*	
29*	*Cordelia*	
29*	*Carysfort*	3,800*
29*	*Cleopatra*	
29*	*Comus*	
29*	*Caroline*	
29*	*Champion*	
29*	*Arethusa*	
29	*Aurora*	
29	*Galatea*	
29	*Inconstant*	3,750
29	*Penelope*	
29	*Phaeton*	
29	*Royalist*	
29	*Undaunted*	
26	Birmingham	
26	Lowestoft	5,400
26	Nottingham	
26	*Brisbane*†	
25½	Chatham	
25½	Dublin	
25½	Southampton	5,400
25½	Melbourne†	
25½	Sydney†	
24¾	Dartmouth	
24¾	Falmouth	
24¾	Weymouth	5,250
24¾	Yarmouth	
25	Bristol	
25	Glasgow	
25	Gloucester	4,800
25	Liverpool	
25	Newcastle	
19¾	Crescent	7,700
20	Edgar	7,350
20	Endymion	7,350
19¾	Gibraltar	7,700
20	Grafton	7,350
20	Hawke	7,350
19¾	Royal Arthur	7.700
20	Theseus	7,350
19½	Diana	
19½	Dido	
19½	Doris	5,600
19½	Eclipse	
19½	Isis	

GERMANY.

Speed.	Name.	Displacement.
kts.		tons.
27½	*Ers. Gazelle*	
27½	*Ers. Niobe*	
27½	*Ers. Gefion*	
27½	*Ers. Hela*	5,000*
27½	*Regensburg*	
27½	*Graudenz*	
27	Karlsruhe	4,820
27	Rostock	
27	Stralsund	
27	Strassburg	4,500
27	Breslau	
27	Magdeburg	
21	Kaiserin Augusta	5,956
19½	Freya	
19½	Hertha	5,569
19½	Victoria Luise	
19½	Hansa	5,791
19½	Vineta	

AUSTRIA-HUNGARY.

Speed.	Name.	Displacement.
kts.		tons.
19	K. Maria Theresia	5,187
20½	Karl VI.	6,151

ITALY.

Speed.	Name.	Displacement.
kts.		tons.

FRANCE.

Speed.	Name.	Displacement.
kts.		tons.
19	D'Entrecasteaux	7,995
23	Guichen	8,151
23	Châteaurenault	7,898
18	Bruix	4,735
19	Pothuau	5,374
23	Jurien de la Gravière	5,595

RUSSIA.

Speed.	Name.	Displacement.
kts.		tons.
27½	*Adml. Grieg*	
27½	*Svietlana*	
27½	*Adml. Boutakoff*	
27½	*Adml. Spiridoff*	7,600
27½	*Adml. Lazareff*	
27½	*Adml. Nakhimoff*	
20	Aurora	6,731
23	Askold	5,905
23	Bogatyr	
23	Kagul	
23	Pamyat Mercuria	6,675
23	Oleg	

UNITED STATES.

Speed.	Name.	Displacement.
kts.		tons.
22·8	Columbia	7,350
23	Minneapolis	
21½	Olympia	5,870

* Estimated. † Australian Navy.

TABLE V.—LIGHT CRUISERS (*continued*).

GREAT BRITAIN.			GERMANY.			AUSTRIA-HUNGARY.			ITALY.			FRANCE.			RUSSIA.			UNITED STATES.		
Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.
kts.		tons.	kts.		tons.	kts.		tons.	kts.		tons.	kts.		tons.	kts.		tons.	kts.		tons.
19½	Juno																			
19½	Minerva	5,600																		
19½	Talbot																			
19½	Venus																			
19	Furious																			
19	Vindictive	5,750																		
20	Hermes																			
20	Highflyer	5,600																		
20	Hyacinth																			
21	Challenger	5,880																		
21	Encounter†																			
25	Fearless		27	Augsburg	4,280	26	Adm. Spaun		22	*Basilicata*	2,460	20	Lavoisier	2,285	27½	*Adml Nevelskoi*		24	Birmingham	
25	Active		27	Köln		27	*Saida*		22	*Campania*		20½	D'Estrées	2,421	27½	*Mouravieff*	4,300	24	Chester	3,750
25	Amphion	3,440	25½	Kolberg	4,234	27	*Helgoland*	3,500	29	Quarto	3,220	19½	Friant	3,882		*Amoursky*		24	Salem	
25	Blonde		25½	Mainz		27	*Novara*		29	*Marsala*	3,400	19	Descartes	3,970	19	Almaz	3,285	20	Albany	3,487
25	Blanche	3,350	24½	Emden	3,544	20	Aspern	2,362	29	*Nino Bixio*		19	Cassard	3,890	23	Jemtchug	3,106	20	New Orleans	
25	Bellona		24½	Dresden		20	Szigetvar	2,313	21	Piemonte	2,597	19	Du Chayla	3,890				19	Cincinnati	3,213
25	Boadicea	3,300	23½	Stuttgart		20	Zenta	2,264	17	Calabria	2,428							19	Raleigh	
23	Amethyst		23½	Nürnberg	3,396				18	Elba	2,690									
22	Diamond		23½	Stettin					19	Etruria	2,245									
22	Sapphire	3,000	23	Königsberg	3,346				18	Liguria										
22	Topaze		23	Bremen					20	Puglia	2,498									
19½	Astræa		23	Hamburg																
19½	Charybdis		23	Berlin																
19½	Fox	4,360	23	München	3,200															
19½	Hermione		23	Lubeck																
20	Sappho	3,400	23	Leipzig																
19	Philomel	2,575	23	Danzig																
20½	Pelorus		21½	Frauenlob																
20	Proserpine	2,135	21½	Arcona	2,657															
20	Pegasus		21½	Undine																
20	Pyramus		21	Medusa																
20	Pioneer†	2,200	21	Nymphe																
20	Psyche		21	Amazone	2,618															
25	Adventure	2,670	21	Ariadne																
25	Attentive		21½	Thetis																
25	Foresight	2,850	21	Gazelle	2,603															
25	Forward		21	Niobe																
25	Patrol	2,910																		
25	Pathfinder																			
25	Sentinel	2,895																		
25	Skirmisher																			
	89 ships.‡	399,205		45 ships.	178,202		9 ships.	32,277		11 ships.§	29,613		12 ships.	60,086		16 ships.	99,927		10 ships.	45,220

† Australian Navy. ‡ Four projected. § Two projected.

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EFFECTIVE FIGHTING SHIPS, BUILT AND BUILDING.

Class.	Great Britain Built.	Great Britain Building.	Great Britain Total.	Germany Built.	Germany Building.	Germany Total.	Austria-Hungary Built.	Austria-Hungary Building.	Austria-Hungary Total.
BATTLESHIPS:—									
Modern	21	13	34	13	7	20	2	2	4
Battle-cruisers ...	9	1	10	4	4	8	—	—	—
Older Battleships	38	—	38	20	—	20	9	—	9
Total ...	68	14	82	37	11	48	11	2	13
CRUISERS:—									
1st Class	38	—	38	9	—	9	1	—	1
Light	72	17	89	39	6	45	6	3	9
Total ...	110	17	127	48	6	54	7	3	10

Class.	Italy Built.	Italy Building.	Italy Total.	France Built.	France Building.	France Total.	Russia Built.	Russia Building.	Russia Total.	United States Built.	United States Building.	United States Total.
BATTLESHIPS:—												
Modern	3	4	7	8	10	18	2	7	9	9	5	14
Battle-cruisers ...	—	—	—	—	—	—	—	4	4	—	—	—
Older Battleships	8	—	8	13	—	13	6	—	6	22	—	22
Total ...	11	4	15	21	10	31	8	11	19	31	5	36
CRUISERS:—												
1st Class	9	—	9	18	—	18	6	—	6	15	—	15
Light	7	4	11	12	—	12	8	8	16	10	—	10
Total ...	16	4	20	30	—	30	14	8	22	25	—	25

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Torpedo Flotillas.

Class.	Great Britain.			Germany.			Austria-Hungary			Italy.			France.			Russia.			United States.		
	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.
Destroyers ..	218	20	238†	142	10	152‡	19	—	19	36	10	46§	83	4	87	105	36	141	52	8	60¶
Torpedo Boats* 1st & 2nd Class	70	—	70	47	—	47	58	27	85	70	5	75	153	—	153	25	—	25	21	—	21
Submarine Boats	76	20	96	27	12	39	10	4	14	18	2	20	70	23	93	25	18	43	29	21	50

* Excluding boats over 20 years old. † 12 projected. ‡ 12 projected. § 3 projected. ¶ 3 projected.

Three British Dominion destroyers built, three under construction; two Dominion submarines.

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Total Naval Expenditure, Voted or Estimated.

	Great Britain.	Germany.	Italy.	France.	Russia.	Austria-Hungary.	United States.
	£	£	£	£	£	£	£
1905	33,151,841	11,301,370	5,040,000	12,667,856	12,392,684	3,838,975	24,444,948
1906	31,472,087	12,005,871	5,322,154	12,245,740	12,490,444	2,398,223	21,358,199
1907	31,251,156	14,225,000	5,661,822	12,486,793	8,850,240	2,713,540	21,260,732
1908	32,181,309	16,490,000	6,266,193	12,797,308	10,222,733	2,477,671	26,438,434
1909	35,734,015	19,702,685	6,537,118	13,353,825	9,650,167	4,068,333	28,990,592
1910	40,419,336	20,845,000	8,341,766	15,023,019	9,723,574	3,545,727	27,848,111
1911	42,414,257	22,031,788	8,379,940	17,370,960	11,693,870	5,152,382	26,569,606
1912	45,075,400	22,609,540	8,566,505	18,090,758	17,681,207	5,823,203	25,944,798
1913	46,309,300	23,041,904	10,269,460	20,847,763*	25,392,784	5,985,715	28,919,456
1914	51,550,000	23,444,129	10,411,383	19,818,052	26,704,738	3,889,420†	29,675,835

* Includes supplementary expenditure.
† Half-Year, January–June, 1914.

Amount Voted or Estimated for New Construction.

The Actual Expenditure for Great Britain is shown in Italics.

	Great Britain.	Germany.	Italy.	France.	Russia.	Austria-Hungary.	U. States.
	£	£	£	£	£	£	£
1905	11,291,002 (*11,368,744*)	4,720,206	1,714,556	4,705,295	4,576,370	2,371,916	8,683,000
1906	10,859,500 (*10,486,397*)	5,167,319	1,362,207	4,652,010	4,576,583	1,012,499	6,776,086
1907	9,227,000 (*9,849,589*)	5,910,959	1,398,111	4,138,967	2,846,268	1,186,667	4,872,888
1908	8,660,202 (*9,521,930*)	7,795,499	1,866,358	4,193,544	2,703,721	716,662	6,227,874
1909	11,227,194* (*11,076,551*)	10,177,062	2,190,707	4,517,766	1,758,487	1,908,331	7,976,897
1910	14,957,430 (*14,755,259*)	11,392,856	2,981,200	4,977,682	1,424,013	1,583,333	6,889,005
1911	17,566,877 (*15,059,881*)	11,710,859	2,677,302	5,876,659	3,216,396	3,125,000	5,343,789
1912	17,271,527 (*14,595,527*)	11,491,187	2,400,000‡	6,997,582	7,940,094	3,620,881	4,998,145
1913	16,101,544	11,176,407	2,800,000‡	8,893,064	10,953,616	3,280,478†	§8,459,194
1914	15,628,267	10,674,033	..	10,730,520	..	..	..

* Includes Supplementary Estimate, £689,100.
† Part of a supplementary vote will be expended during the year; the totals for 1905-7 include charges for submarine stations, &c.
‡ Should be increased by sum available under Law of 1911.
§ Amount in original Estimates, subsequently reduced by Congress.

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CHAPTER IV.

The Right of Capture in Maritime War.

Grotius defined the rights of war as "that which may be done without injustice to an enemy." The idea of what is just and what is unjust with regard to an enemy has altered very considerably since those words were written, 300 years ago, but the sentiment which is expressed by them exactly represents the ideal of the present day.

In war, as in most other things where human nature is involved, the ultimate course of events is settled, not so much on any particular abstract rules, as on a compromise between a variety of often conflicting principles. It is thus that the general idea of what is considered to be "just and what is unjust with regard to our enemy" has been arrived at. The jurist tries to confine belligerent rights within the strict letter of theoretical law, the strategist tries to extend them to the utmost limit of what is called regulated violence, while the statesman endeavours to hold the balance, and to decide what is expedient and what is inexpedient. In all discussions concerning the "rights of war," these conflicting interests must be borne in mind, and due weight given to each of them, because International Law, as we know it now, is not the result of any one of them, but a compromise arrived at by the co-ordination of all three points of view.

In maritime war the most important "right of war" is the right of capture which is claimed by belligerent vessels and conceded to them with certain limitations.

Belligerents and neutrals.

In the early days of intercourse at sea every vessel encountered was either a friend or an enemy, and there was little restriction on the proceedings of belligerents. With the growing power of the Sovereigns, and the consolidation of their States into more or less homogeneous nations, it was found to be inexpedient and dangerous to allow an indiscriminate right of capture, and the right in consequence became limited to the ships of the particular nationality which was a party to the dispute, all others being considered to be neutral and normally free from capture.

With the exemption of the trade of the neutral from interference, a duty was imposed on him, that he was not to assist either belligerent, but must remain in fact, as well as in name, neutral. It has taken

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five centuries to work out a set of rules that can be considered in any way satisfactory, and all through the controversy oscillations of policy, due to the conflicting principles involved, have been very marked. The penalty for not conforming to this duty is confiscation, but as it stands on quite a different footing from the right claimed to capture belligerent property, it will be dealt with in detail later on.

A belligerent claimed the right to capture enemy property whereever he could find it, whether it was a public ship, a private ship, or goods of any description, embarked in any ship, neutral or belligerent. Here, again, the conflict between what has been claimed as a right, the limitations proposed by the jurist, and what has been found to be expedient can be clearly traced.

With regard to public ships, there has never been any question that they are, with certain well-defined exceptions, liable to capture at all times when not in neutral waters. The right to capture private ships is, however, much criticised, and it will be necessary to examine the grounds on which the right is based more closely. Enemy goods embarked in an enemy ship follow the fate of the ship, and will be considered with it.

Nature of the right of capture.

The right is claimed, not so much as an abstract right capable of legal justification, but as part of the rights accruing to a belligerent in consequence of the state of war which exists between him and his enemy. It is, therefore, inseparable from the conception of war, and in order to appreciate it, the nature of war must first be realised. War is undertaken to attain something, or to prevent our enemy from attaining something, and in order that the state of peace may again prevail we propose to ourselves to force our enemy to conform to our will. Now, the obstacle that the enemy interposes between us and our object on the one hand, or uses as his weapon on the other, is the armed force that he possesses. Since war is a recognised state of relationship between two Powers, it follows that the right to remove the obstacle that lies between us and the attainment of our object is a legal one, otherwise war could not exist. Therefore, the whole armed force of the enemy, both on sea and on land, are legitimate objects for attack, capture or destruction.

Application of principles.

About the end of the thirteenth century the increase of commerce in the Mediterranean brought about various attempts to regulate the proceedings of belligerents, and the most famous of the treatises that were then written on the subject was the *Consolato del Mare*. The rule there laid down was that the enemy's goods were liable to seizure wherever they were found, even in neutral ships, but that neutral goods were free even if discovered on board an enemy's ship, after satisfying certain claims.

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Except where modified by treaties this continued to be the British rule until 1856, when the Declaration of Paris was signed. The French rule up to the middle of the seventeenth century was even harsher than the British, for she not only confiscated enemy goods found in neutral ships but she considered the ships themselves to be tainted by the goods and condemned them also. This was the period of the height of the Dutch naval prosperity, and, as they were then the principal carriers of trade at sea, we find them enunciating the converse doctrine of "Free ships, free goods; enemy ships, enemy goods." France and Spain adhered in the main to the new doctrine, although we find the former seizing the goods of her enemy on board neutral ships from 1793 to 1800. Russia was frankly opportunist, and held out for the rule of "Free ships, free goods" when she was neutral, but as soon as she became belligerent she claimed the right to capture enemy goods wherever she could find them.

The British practice of taking her enemy's goods out of neutral ships raised the indignation of neutral States, and, under the leadership of Russia, the two Armed Neutralities of 1780 and 1800 were formed against her. Of these, the first was the more important in its results, as England was at that time too weak to do more than protest, but it could not stand the strain of war, and in 1788 it fell to pieces. The end of the second is too well known to need relating here.

The United States adhered to the British practice on the whole, but she made many treaties with various States affirming the rule of "Free ships, free goods."

The British practice.

The general situation remained thus until the Crimean war when France and England were allies. Between the two there was no possibility for neutral trade in enemy goods to exist, for what the British cruiser left the French would have taken. It was obviously necessary for a compromise of some sort to be arrived at, and the allies agreed eventually on identical action, each giving way on a part of their claims. The rule, as then adopted, afterwards formed part of the Declaration of Paris,* and received the assent of all the principal Maritime Powers except Spain and the United States. The latter refused to sign unless the declaration was enlarged to include the exemption of private property, except contraband, from capture on the high seas. The history of this controversy is

* 1. Privateering is and remains abolished. 2. The neutral flag covers the enemy's goods, with the exception of contraband of war. 3. Neutral goods, with the exception of contraband of war, are not liable to capture under enemy's flag. 4. Blockades in order to be legally binding must be effective—that is to say, maintained by a force sufficient really to prohibit access to the enemy's coast.

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illustrative of the way in which International Law has grown and, in fact, is growing now. When the belligerent is strong she pushes the rights of war to the utmost; then the pressure of neutral protests bring about treaties modifying her pretensions, which are, however, duly reasserted at the first opportunity. Finally a compromise is arrived at by which some of the rights claimed on both sides are admitted, and a general convention is signed binding all States to the same procedure.

Attitude of the United States.

The action of the United States in bringing forward the question of the immunity of private property at sea from capture was perfectly consistent with the attitude of her Government ever since she became an independent State. She first urged it on this country in 1783, during the negotiations for the Treaty of Peace after the war of the American Independence, when Benjamin Franklin endeavoured to obtain the insertion of the following clause:—"And all the merchants and traders with their unarmed vessels, employed in commerce, exchanging the products of different nations, and thereby rendering the necessary conveniences and comforts of human life more easy to obtain and more general, shall be allowed to pass freely unmolested. And neither of the Powers, parties to this Treaty, shall grant or issue any commission to any private armed vessel empowering them to take or destroy such trading ships or interrupt such commerce."

Since then the attempt has been renewed more than once, and with other Powers besides Great Britain, the last time being at the Hague Conference in 1907. This clause, with slight variations, is to be found in two Treaties concluded by the United States—one with Frederick the Great in 1785, and the other with Italy in 1871.

During the war of 1866 between Prussia, Austria, and Italy the three Powers agreed not to touch private property on the high seas. Prussia also proposed to France in 1870 that private property, not being contraband, should be immune from capture, but the French Government did not see their way clear to agree to the suggestion, so the proposal was dropped.

Arguments opposed to the right of capture.

In our own country many great men have expressed themselves in favour of the immunity of private property at sea, from Lord Brougham in 1806 to Lord Loreburn in 1905. Mr. Cobden spoke strongly in favour of it as the logical corollary of the Declaration of Paris, and so did J. S. Mill and others. On the Continent there are many adherents of the doctrine, including such International Jurists as Calvo, Fiori, Martens and Blunschli.

The arguments in favour of freedom from capture may be divided into three categories, namely, legal, strategical, and sentimental.

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1. Legal. It is said that since private property on land is exempt from capture, it follows that the same property on the sea should also be exempt, because there is no difference between them.

A whole web of legal argument has been woven round the following statement of J. J. Rousseau in the *Contrat Social,* a work which has had enormous influence on continental thought. He says: "La guerre n'est point une relation d'homme à homme, mais une relation d'état à état, dans laquelle les particuliers ne sont ennemies qu'accidentellement, non point comme hommes, ni mêmes commes citoyens, mais comme soldats; non comme membres de la patrie, mais comme ses défenseurs. Enfin chaque état ne peut avoir pour ennemies que d'autres états et non pas des hommes, attendu qu'entre choses de diverses natures on ne peut fixer aucun vrai rapport."

2. Strategical. It is said that the capture of private property at sea has not hindered any nation from going to war, nor has it hastened the conclusion of any great war.

Since Great Britain cannot import nor export anything except across the sea, and since other countries are not so dependent on the sea for the conduct of their trade, it is said that she stands to lose far more than other States by the retention of the rule.

3. Sentimental. The merchants and shipowners whose property is liable to confiscation on the high seas in times of war are peaceable, inoffensive traders, whose only interest in the war lies in the fact that they are nationals of one or other of the two belligerent States. It is argued that they are taking no part in the war, and that it is very hard on them that they should be penalised for carrying on, what is, in the last resort, quite as much for the general good of mankind as for their own individual benefit, namely, international trade and exchange of commodities.

It is further contended that the neutral shipper is penalised, for, though his goods are not confiscated, he has to stand the loss of his freight, as well as that caused by his goods being discharged at some port for which they were not destined. The neutral has no interest in the war and therefore he ought not to be forced to bear this loss.

The right of capture and the principles of war.

In order to appreciate the other side of the argument it is necessary to revert to the fundamental conception of what war is. We endeavour to attain or to prevent our enemy from attaining something, and that, in the majority of wars, is the control of Trade. By control we mean such a power of regulation over the conditions under which Trade is conducted as will prevent the markets from being exploited to our disadvantage, and thereby hinder the

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development of our wealth and resources that is necessary in consequence of the increase of our population.

There are two great causes which have operated on the minds of Sovereigns, Governments, and Peoples to bring about war—one is Religion and the other is Trade. The so-called dynastic wars were, in reality, trade wars under another guise, for the real object of the Prince that was endeavouring to turn out the existing occupant of the throne was to gather the power into his own hand through the acquisition of territory, and so to acquire wealth, through the trade and commerce of the country, for himself and his family. A motive is none the less real because it is not consciously felt, and it is seldom that Trade is the obvious object of a war. The real fundamental object of nearly every war that has been waged by Great Britain, however, has been to prevent the possible loss of markets through the domination of territory by Powers hostile to her, and to protect her trade interests generally.

Trade the main-spring of war.

A striking example of this is to be found in the instructions to the British Minister who was accredited to Madrid at the close of the War of the Spanish Succession. In this document the following sentence occurs: "The preservation of the commerce between the kingdoms of Great Britain and Spain was one of the chief motives that induced our two Royal Predecessors to enter into the late long, expensive war, and one of the principal benefits expected by our people from the conclusion of a peace after such a glorious and uninterrupted course of successes, and is of the greatest importance to the interest of our subjects, and to the riches of our dominions." The war was a dynastic one, and yet it was clearly recognised by the British Government as a war in which, as far as Great Britain was concerned, Trade was the controlling factor.

In order to see clearly the difference between private property on land and the same property on the sea, it is necessary to enquire what constitutes Trade. It is private property in circulation, passing from hand to hand, and enriching each as it passes. It is not the same property lying in a warehouse waiting to be circulated, or even in the course of manufacture.

Trade is the life blood of every civilised nation, and without it no nation can live at the present day. Every increase in the number of mouths in a community that have to be fed necessitates at least one of three things:—(1) An increase of land under cultivation, or, what is the same thing, more intensive cultivation of what is already in use; (2) greater subdivision of what is produced; (3) increase of trade to enable the community to buy excess of products from other districts. Since most European countries have ceased to produce enough food

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for their population it follows that they must import it. To import food means that they must earn money with which to buy it, and in order to obtain the bullion, or, what is the same thing, the credit, Trade must flourish. And it must again be reiterated that Trade is not the production of commodities but the exchange of these commodities after they have been produced.

It is often stated that war is caused by greed of territory or lust of land, but this is only stating the effect for the cause. The pressure of increasing population is just as inexorable a spur to drive a growing nation to seek its fortune out of its native land as it was in the Middle Ages; but now, instead of requiring new territory as fresh pastures for their flocks and herds, it is wanted in order to open additional markets, or to prevent markets already opened from being closed to them.

Trade and national life.

As a factor in strategy, then, Trade is not the mere exchange of goods between private individuals, but a highly complex function of the national life which, if atrophied, augurs paralysis to the nation. Now, if from this point of view we compare war on land with war on sea with reference to its effect on Trade, we see that there is fundamentally little difference. When a belligerent occupies the territory of her enemy she thereby stops all Trade, partly because she monopolises all the means of transportation, and partly through the prohibition of communication between the occupied districts and those that still remain in the hands of the enemy. Besides this, the actual destruction of private property is very great, owing to the various accidents and exigencies of war. All public and civil life is at a standstill, and such Trade as is permitted is only allowed in so far as it provides for the necessities of the army of occupation and for the administration of the district. Requisitions and contributions add their weight to the oppression that is on the land, until at last the choice has to be made between facing further ruinous loss by continuing the struggle, or agreeing to conform to the will of the invader.

The right of plunder, which was claimed by armies in the field, was defended as being only a very rigorous method of applying strategical pressure to the enemy, but it was forbidden at an early stage of the history of war. This was done, not from humanitarian motives, although it is often maintained that it was so, but in order that the occupied districts should continue to be in a state to support the army of occupation as long as possible, and also so as not to reduce the inhabitants to absolute despair and induce guerilla warfare. It offended against the principles of strategy, and therefore it was condemned.

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On the sea, also, the procedure is the same, allowing for the difference in the essential conditions. The chief of these is that at sea there can be no occupation in the same sense as on land, and therefore, if the Trade of the enemy is to be stopped, it must be done by actually seizing the vessels belonging to the enemy, with their cargoes, before they can arrive at their destinations. The effect on the enemy is the same as that obtained by the occupation of his territory, but the loss of life and the suffering caused is nothing like as great.

Fallacies of Rousseau.

Rousseau's doctrine that when two States are at war it is only the States that are involved, and that the individuals are only enemies as soldiers and not as men, nor even as citizens of their respective States, is responsible for a great deal of false reasoning. It is impossible to dissociate the members of a State from the State itself; they are all integral parts of it, and must stand or fall with it. The welfare of the State is the sum total of the welfare of its component parts, and it is through their prosperity that the State flourishes. Therefore, to say that two States may be at war, but that the ordinary intercourse between the individuals composing these States should not be interrupted, except as regards the individuals who are engaged as part of the respective fighting forces, is to ignore all human nature. If it were true, then the logical deduction is that huge armaments are wrong, and all international disputes should be settled by the wager of battle between the heads of the respective States, or the responsible ministers, or picked teams of the respective legislatures, or some such inexpensive method.

The liability of philosophers to idealise the conception of war, instead of treating it as a stern reality which is not exceptional in its general relationship to outside influences, but is subject to the ordinary rules that govern human affairs, has led to the habit of considering each section of the war as something apart and distinct from all its surroundings. In reality there is no phase of human intercourse which is so susceptible to the effects of action and reaction. Everybody is highly strung and nerves are at their highest tension, so that public feeling responds quickly to the varying incidents of the struggle.

Effect of restriction of trade on war.

Nowhere is this liability to separate various parts of the war from surrounding circumstances more evident than in the numerous discussions that are published on the subject of the effect of the capture of private property at sea on the result of a war, and no conclusions are of any real value unless the whole circumstances of the struggle are taken into account. Thus, in assessing the effect on the Napoleonic wars, due allowance must be made for the retaliatory measures which were forced on the Emperor in his endeavours to

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abate the pressure that was slowly but surely crushing the life out of France. It was this combined effect that finally detached his Allies and enabled England to bolster up the coalitions against his tyranny, which in the end restored peace to the Continent of Europe after more than twenty years of almost incessant war. The reason why this form of pressure is so strong is not far to seek. Transportation is one of the essential parts of trade, and efficient and cheap transportation is the key of successful commerce. Of all systems of transportation that by sea is the cheapest and most efficient; and even at the present day, with the enormous increase of railway facilities, land transport cannot compete with the sea. It was the denial of sea transport to France which more than anything else compelled her to accept the conditions of peace dictated by the Allies. It was the pressure produced by this stoppage of all Trade that drove the Emperor to undertake enterprises that were beyond his strength in his endeavours to restore the shaken credit and dilapidated finances of his country.

It was the prohibition of all sea-borne trade to the United States by the British cruisers towards the close of the war of 1812–1814 that caused them to accept very different terms of peace from those that they had set out to obtain.

It was the pressure of the blockade of the Southern ports by the Federal ships during the War of Secession which reduced the Confederate States to impotence through their inability to procure supplies of any kind, and so shortened the period of the war. In fact, in every war in which Maritime Trade has been a factor, it has proved itself in the end to be the controlling factor in the situation.

It is, moreover, not correct to speak of the sea-borne trade as distinct from the land trade. They are both essential parts of the general Trade of the country, and in those States where the sea-borne trade forms any considerable part of the total commerce of the country one part cannot exist without the other, so that any attempt to dissociate one from the other for the purpose of drawing certain conclusions must lead to faulty deductions.

Danger to trade a deterrent from war.

The above examples will suffice to show the effect that the stoppage of the sea-borne trade of a country has had upon its councils in favour of peace when war has once broken out. That the fear of the cessation of Trade has prevented war in any specific case it is impossible to prove, but if common report is to be trusted something very like it occurred on the occasion of the Agadir incident in 1911.

Admitting the strength of this form of pressure, it is argued that Great Britain will be more affected by its retention than other nations, and will stand to gain most by its abolition. It appears,

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however, that here, again, conclusions are arrived at which are open to serious objection because the whole of the conditions of the problem are not considered. There are two aspects of the question—first, the apparent greater liability to loss on account of the greater number of British ships on the sea; second, the danger of the transfer of large numbers of British ships to neutral flags.

Strategy of capture.

In order to capture a ship, the enemy's cruiser must be operating on the trade route or line of communication. Since the lines of communication for both our enemy and ourselves are the same, it follows that the ships that we use to stop his trade will at the same time defend ours, for it must be assumed that we are attacking his Trade at the same time as he is menacing ours. It is impossible to overhaul a ship, to ascertain her nationality, remove the crew, and sink her in less than probably two or three hours, and practical experience shows it often takes much longer. Besides this, much time will be lost in boarding neutrals, and if a cruiser were to be seen searching ships, every ship in sight would disappear below the horizon as fast as she could possibly steam away. At the present day a new factor has arisen which will largely assist the defence of trade, namely wireless telegraphy. By its means information can be distributed over large areas with great rapidity, and the presence of a hostile cruiser notified to the ships detailed for the defence of the trade route immediately her activities commence. That there will be loss is admitted, but that it will be overwhelming is not by any means so certain, provided we adhere to our traditional policy.

The transfer to foreign flags to escape the consequences of belligerency is not recognised by any nation, and unless it can be proved that the sale has been effected in the ordinary course of trade, and the transfer is a *boná-fide* one, it will not avail to cover the property from capture.

Fallacious arguments against capture.

It is also stated that British ships will be laid up and that all the freight will go to neutral flags. There is not, however, enough foreign shipping to take the British trade thus displaced; and if we assume that our enemy with an inferior Navy can make the lines of passage and communication unsafe for our ships, we must also assume that we can at least make the same lines equally unsafe for his vessels. Therefore, besides British cargoes there will be the enemy's cargoes also wanting freight, and there will not be enough to accommodate them all. The teaching of history is that whichever side can render the conduct of trade more precarious for the enemy, and so provide the more efficient protection for her own trade, will eventually absorb it all.

The merchants and shipowners whose property is at risk do not, it is true, take any direct part in the war, but their indirect

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interest is very great, for they are the people through whom the Trade of the country is carried on, and it is they who to a great extent provide the means by which the war can be continued. Therefore it cannot be truly said that they ought to be considered as being entirely outside the effects of war.

The neutral shipper is much more to be pitied, because he has not necessarily any interest in the war. At the same time he ships his goods with his eyes open, knowing the dangers he has to run, and in any case they are no more, if as much as those he has to face if he wishes to carry on his trade in the enemy's country itself.

Blockade.

It is often contended that the right of blockade gives a belligerent sufficient power to prevent the Trade of the enemy from passing, but it is a right that Governments are very unwilling to put into operation except under very pressing circumstances. History supplies many examples of blockades proposed by the naval authorities being disallowed by the politician, generally on account of the hardship thereby inflicted on the neutral. The motive is not the altruistic one that it appears to be at first sight, but it is an endeavour to avert the danger of raising up fresh enemies during the course of a war by driving the neutral to extremes. The right has always been claimed by a belligerent, and, provided that it is properly declared and effectively exercised, is one that is never questioned. It corresponds closely with the right of prohibiting all communication with a place on land by investing it. The fact that one or two blockade runners succeed in getting through does not vitiate the effectiveness of the blockade, the real criterion being that there is evident danger to any ship attempting to enter or leave the port after the blockade has been declared.

This right is exercised against all vessels, belligerent and neutral alike, and the penalty is confiscation of the ship and cargo. The right is not of the same character as that by virtue of which belligerent ships are liable to capture. It is the enforcement of obedience to a lawful command, which, provided the blockader conforms to certain conditions, he is empowered to issue in consequence of the state of war which exists, and it is binding on all ships without exception.

Duties of neutrals.

The right of capture of neutrals under certain circumstances is of a somewhat similar nature. It is the penalty inflicted for the contravention of certain rules that the belligerent has the right to prescribe and enforce.

The most important rule is that a neutral State is bound to take effective steps to prevent any organised assistance from being prepared or despatched, from the territory over which she has control,

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to either belligerent. Vessels despatched under these conditions are, of course, liable to capture. The aggrieved belligerent can, in the event of satisfaction being refused, include the offending neutral in the war.

The supply of contraband to either belligerent is forbidden. Since it would be impossible for a State to exercise such a measure of control over her subjects in all parts of the world that she could effectively prevent them from embarking in such an enterprise, her duty ends with warning them that if they do attempt to trade in contraband they do so at their own risk. Under these circumstances belligerents have the right to protect themselves, and if their cruisers find a neutral ship engaged in this traffic, they can send her into port for adjudication, when, if found guilty, she becomes liable to certain defined penalties, which vary with the degree of the offence. The ordinary carriage of contraband by the ships of a neutral State does not give a belligerent any claim for redress against the State.

The offence of "unneutral service" invariably carries with it the penalty of confiscation on conviction. It lies on the border-line between organised assistance and the carriage of contraband, but the State would not be held responsible for the acts of her merchant shipping in this respect unless, perhaps, they were of a very persistent and flagrant nature.

The act of capture.

It is impossible to know what the true character of a ship is by looking at her from the outside, for it is no offence to carry false colours, provided that no hostile act is done while showing them. Public vessels of both belligerents have the right, therefore, to stop and examine any merchant vessel on the high seas in order to verify her right to fly the flag she is showing, to ascertain her destination and the character of her cargo. This right is strictly analogous to that of a railway inspector who examines the tickets of the passengers. Since the exercise of this right is solely for the purpose of enabling the belligerent to maintain his legitimate control over the traffic on the high seas, and entails no penal consequences on a ship that is not infringing the rules that the belligerent has a legal right to enforce, any resistance to the officer sent on board to examine the papers carries with it the penalty of confiscation.

Resistance to capture.

Closely connected with the right of capture is the reciprocal right of resistance to capture. The belligerent violates no law by attempting to carry on his trade, in spite of the efforts of his enemy to prevent him, and his position is a perfectly legal one. He is not called upon to recognise the authority of the enemy's officers; to do so is, in fact, almost like requiring him to accept the conclusion of the war before the end has been reached. The enemy's officers have no right to

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insist on the substitution of the sovereignty of their ruler for that of the ship's own ruler, except as an act of war—an act which the crew have every right to resist by all the means in their power. This right has been specifically recognised as belonging to the inhabitants of towns, villages, and districts on land before they have been occupied, and it has never been questioned in any maritime war that has ever been waged. In the event of capture, the crew become prisoners-of-war under the same conditions as the crew of public ships.

The neutral is, however, in quite a different case. The right of capture that a belligerent has with regard to him is only that of arrest previous to trial for the violation of certain rules that are legally binding on him. Resistance is, therefore, resistance to lawful arrest, and is punishable as such.

If the immunity of private property at sea from capture, with the exception of contraband, were the accepted rule of war, then belligerent ships would be in the same position as regards resistance to capture as neutrals are now. They would only be liable to capture if they had broken rules lawfully made by the belligerent, and their arrest would be an administrative act against which they would have no right of resistance.

Summary of the arguments.

To sum up the whole question, a belligerent has full right, as the law now stands, to throttle his enemy by stopping his Trade; that is to say, the free exchange of his goods both on land and by sea. The first is done by the occupation of his territory, and the second by the capture of his ships. The armed forces, both naval and military, are important in so far as they stand between the belligerent and the attainment of his object. Since in war, if the strategy is not hopelessly wrong, they are always found protecting the vital points, they are often confounded with the real object which is only attainable after they have been swept aside and it is exposed.

The writer contends that the fundamental cause of the greater part of the wars between civilised States has been Trade in one form or another. If Trade as a whole is withdrawn from the operation of war the object that the armed forces of the State are designed to protect no longer needs protection, and war will be reduced to a series of gladiatorial contests that have no real meaning.

But on land Trade cannot be exempted from the operation of war from the very nature of things, and, therefore, if Trade at sea is to be inviolable, a Maritime State must do one of two things. She must either give up her right to strike at her antagonist in the only spot which lies directly open to attack, or raise a huge army with which she can engage with her enemy in the continental form of Trade suppression, namely, occupation of territory. If the latter choice is

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made, a large navy must be maintained to escort the army to the point of attack and to keep open the line of communications.

The question whether the right shall be given up or not is one that can be argued on no other grounds but those of high policy. The right exists and has stood the test of many years of warfare and it should only be abandoned by the deliberate act of the various States concerned after fully weighing all the arguments both for and against it.

The arguments affecting the question of the abolition of the right of attack upon commerce may be recapitulated very shortly as follows:—

FOR.

1. All sea-borne Trade will be safe from the effects of war—that is to say, the sea, for all practical purposes, will be outside the theatre of war. All legitimate Trade, whether belligerent or neutral, will continue as in peace time. Arguments stated.

2. The action of the naval forces of the belligerents will be confined to sinking, burning, and destroying the enemy's fleet, in order to assist the attack and defence of the coasts by the military forces and to keep the communications open. They will also have police duties to perform in seeing that no contraband is carried by either neutral or belligerent merchant vessels.

3. The credit of the State, in so far as it will be affected by the security of Trade, will not be liable to serious fluctuation.

4. It is stated that great economies will be realised on account of the consequent decrease of armaments.

5. The neutral will gain greatly in the security of his Trade.

AGAINST.

1. The fear of a successful attack upon Trade has a deterrent effect upon warlike counsels, and influences them generally in favour of peace.

2. The Maritime Powers are being asked to pit themselves against the Continental Powers with one hand tied behind their backs.

3. No purely maritime Power like Great Britain could take part in a war against any of the European Powers with any hope of success, because, if the enemy can transport an army across the sea, Great Britain is at her mercy, while on the other hand, if we can transport an army over the sea, we can do our enemy no harm, because we have no army that is in the least comparable to that of any of the Continental Powers. From this it follows that, in order to place Great Britain on terms of equality with any of the Continental Powers in case of war, it will be necessary for us to raise an

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army that will be able to face theirs in their own territory. There will be no other means left to us to force them to conform to our will.

4. From the above argument it would appear that instead of great economies being realised it is likely in the end to lead to increased expenditure.

5. If the enemy's mercantile marine is free from capture, it is open to him suddenly to increase his fighting force by the conversion of these vessels into men-of-war or to use them as transports for his troops. It is therefore not to the advantage of any Power to exempt them from capture until the moment that they have declared themselves.

We must assume that no Government will deprive themselves of the means of making their voice heard and respected if they wish to retain even the semblance of independence. The choice, therefore, seems to lie between two courses—(*a*) Shall we, for the purpose of placing the sea-borne trade in a privileged position with regard to that of the trade on land, abandon the weapon that has enabled the inhabitants of a small group of islands to become the equals in authority of the large Continental States, and burden ourselves with the provision of a new weapon in order to enable us to maintain that equality? If we so decide, a powerful navy will still be necessary to protect our shores from invasion or to open the route for the army to operate. (*b*) Shall we continue to assert those traditional rights of capture, of which even one of the most ardent of the advocates of the abolition of immunity of private property at sea states that "no operation of war inflicts less suffering than the capture of unarmed vessels at sea," and so retain in our hands an efficient weapon for the maintenance of our position as one of the Great Powers of Europe?

EDMOND J. W. SLADE.

REFERENCES.

Mahan, "Sea Power in its Relation to the War of 1812-14," Vol. I., pp. 144-5. Mahan, "Some Neglected Aspects of War." F. E. Smith, K.C., "International Law," 4th Ed., Part III., Chap. III., pp. 162, *et seq.*; Pt. IV., Chaps. III. to VIII. Latifi, "Effects of War on Property," Chap. V. Latifi, "Note on Belligerent Rights at Sea," Westlake. Atherley Jones, K.C., "Commerce in War," Chaps. IV. and VII. W. E. Hall, "International Law," 6th Ed. pp. 63-70, 437-447. Julian S. Corbett, "The Capture of Private Property at Sea," "Nineteenth Century and After," June, 1907. Also reprinted in "Some Neglected Aspects of War," Mahan. Travers Twiss, "The Law of Nations. The Rights and Duties of Nations in Time of War," pp. 140-188. Oppenheim, "International Law," Vol. II., pp. 59-68, 218-226. Pearce Higgins, "War and the Private Citizen," pp. 66-70. Westlake, "International Law," Part II., pp. 120-132. Maine, "International Law," pp. 105-122. A. G. Hefter, "Le Droit International de l'Europe," 4me Ed. Française, pp. 314, *et seq.* Bluntschli, "Le Droit International codifié," 5me Ed. Française, pp. 46-50, 375-381. Pistoy et Duverdy, "Traité des Prises Maritimes," 1859, pp 5-21. Fiori, "Diritto Internazionale Publico," 3e Ed., 1503-1518. Calvo, "Le Droit International," 5me Ed., 2379-2410. J. B. Moore, "A Digest of International Law," Vol. VII., 1183, 1188, 1195, 1198, 1199; Earl Loreburn, "Capture at Sea"; "Cambridge Modern History," Vol. V., p. 378.

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CHAPTER V.

The Influence of Loads on Ships' Speeds.

By load is meant the weight added to a ship—aerial, submarine, or surface—due to guns, armour, and other fighting requirements, and the aim of the writer is to consider, in the light of recent engineering progress, the influence this load has on the size of the ship, on its speed, and on the power of the propelling machinery. It is not proposed to enter upon any discussion of the relative merits of the arguments of strategists or tacticians as to what constitute "fighting requirements." But it is important to have clearly established the task imposed upon the engineer in meeting the demand for a constant or for an increased speed when greater power of offence or defence, and therefore augmented weight or load, is demanded. Only to the naval architect and the designing and constructive engineer is the full significance obvious, for instance, of an increase in the number or in the calibre of primary or secondary guns, or of greater area or increased thickness of armour. The same problem applies to the submarine and to aerial craft, which are now required to carry greater loads in the form of guns or torpedoes or bombs.

Twin-, treble-, or quadruple gun turrets.

An effectively armoured barbette, with a pair of 14-in. guns, and the great and intricate machinery involved in their operation, together with armour, structural supports, and the requisite ammunition, weighs approximately 1100 tons. If three guns are fitted instead of two, as in some of the Italian ships, the weight is increased to 1520 tons. While if four guns are adopted in each turret, as in the new French ships, the total weight becomes 1920 tons. It is a simple rule in arithmetic to determine that the weight per gun in the first instance—in the twin-gun turret—is 550 tons, in the treble-gun turret 506 tons, and in the quadruple-gun turret 480 tons. The advantage in weight due to the multiple gun turret is thus made clear; there are, however, disadvantages, but the question need not be further considered here, because this is an artillery question, only indirectly affecting the subject under discussion. The point which emerges, so far as influence of load on speed is concerned, is that, whether offensive power is increased by the addition of one twin-gun turret or by the fitting of more than two guns in the same number of turrets, there is an addition to load greatly in excess of the direct

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increase in the weight of the turrets. The ship's structure has to be greatly strengthened in the case of a treble or quadruple gun turret, and the addition to the load carried at a high elevation requires greater beam in the interests of stability. Again, an additional turret, five as against four, or six as against five, even if only two guns are mounted in each, necessitates an increase in length of hull for the accommodation of the turret and the magazines in connection with it. More broadside armour is needed, and unless the thickness is decreased the weight goes up. Again, unless the speed of the ship is to be reduced more boilers and engine power must be provided, and for this again greater space must be provided, resulting in the further lengthening of the ship and additional displacement tonnage, for the driving of which, at the speed desired, additional power must be provided. These are known factors, but are often lost sight of by the advocates of greater fighting equipment.

Queen Elizabeths *versus* Royal Sovereigns.

Setting aside strategical or tactical considerations, and confining attention to the main theme, we may assume a battleship, say, of the Royal Sovereign class, which, as is now well known, has four turrets, each with two 15-in. guns, as in the Queen Elizabeth. The speed in the later ship, the Royal Sovereign, is lower, and consequently the power of the machinery and the space it occupies is less, so that there is a gross reduction in the displacement tonnage from 27,500 tons to 25,750 tons in association with a decrease in length and beam. Were another gun turret added, making five with ten 15-in. guns, what, it may be asked, would be the reduction in speed, other factors being constant or nearly so? The total weight of a 15-in. twin-gun turret, inclusive of ammunition, structural supports, and armour, is about 1500 tons. The introduction of this this additional turret into the ship would reduce the space occupied by the machinery to an amount equivalent to half a boiler room, and the S.H.P. would be less approximately by 5000 H.P. Assuming that the engines were modified to suit the reduced power, and allowing for the consequent reduction in weight of machinery and structure, there would still be a net increase of displacement of about 1100 tons. The fall in speed due to the increased load and smaller power would be approximately 1½ miles per hour.

Gross effect of net increase in load.

The influence of load upon speed may be definitely stated in another way. It may be asked: Provided it is desired to add a given weight, say 500 tons, directly to an existing ship, what would be the aggregate addition involved in the displacement of the ship in order that all other factors should remain constant? In other words, if it were desired to add 500 tons to the weight of the machinery, what would be the additional weight required in the structure of the

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ship, and what would be the further addition to machinery weight to give the higher power necessary to drive the ship at the same speed notwithstanding the resultant increase in the displacement tonnage? If 500 tons were added to the weight of machinery, the increase of power would be 20 per cent. approximately, assuming that the power continues proportional to the weight. The additional power would probably be obtained by introducing half a boiler room, slightly increasing the size of the boilers, lengthening the engine-room and adding to the power of the turbines. To retain nearly the same coefficients of form the practical solution, so far as the hull is concerned, would probably lie in an increase in length of 20 ft. and an increase in breadth of about 6 in. The added weight below the centre of gravity of the original vessel, as well as the increase in breadth, would tend to greater initial stability. But this might be corrected, with a slight advantage to speed, by a small reduction in the coefficient of fineness of the forward portion of the load water plane, keeping at the same time the sectional areas constant. The approximate gain in speed due to the increased power would be one mile per hour, with an increase in normal displacement of about 1000 tons.

Effect on displacement of reduction in thickness of armour.

In view of the opinions held by some distinguished Naval officers on the subject of armour, it may be interesting next to consider the effect, on an existing type of battleship, of reducing the thickness of the main belt of armour so that it would resist 6-in. guns only. Approximately 1000 tons would be saved by thus reducing the main armour belt. The length of the ship could then be reduced by 10 or 12 ft. The saving in the structural weight of the hull consequent on the reduced length and on the lighter structure behind the armour would be about 400 tons. The power of the propulsive machinery might consequently be reduced by 2000 S.H.P. without affecting the speed, involving a further reduction in displacement of 150 tons. The total reduction of displacement would therefore be 1550 tons approximately, and the speed would be the same as that of the original ship.

Cost in speed of thick armour

On the other hand, were the weight saved in the main belt utilised solely to increase speed, 500 tons out of the 1000 tons saved in armour might be utilised to add to the length of the ship, equipment, etc., for the accommodation of larger power machinery, and the remaining 500 tons to augment the weight of machinery itself. The speed of the vessel would be increased 1½ miles per hour by the addition to the S.H.P. of about 6000.

Two more 15-in. guns.

Thus apart altogether from efficiency of propulsion, an additional twin 15-in. gun turret to a battleship involves a reduction in the

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speed of the ship—other things being equal—of 1½ miles per hour, whilst a reduction in the armour on the water-line belt to a thickness sufficient to resist 6-in. guns only would add 1½ miles to the speed. Or alternatively, such reduction in the armour might enable an additional twin 15-in. gun turret to be adopted with very little difference in the size or the speed of the ship.

Effect of speed on light cruisers and destroyers.

In no type of vessel is the influence of load on speed so marked as in light armoured cruisers and torpedo-boat destroyers; but here the load is primarily due to the propelling machinery rather than to guns. While continuing with the same armament, German torpedo-boat destroyers have increased from 30 to 33 knots during the past seven years, and there has been an increase in displacement from 530 to 900 tons in order to admit of the increase of machinery power from 10,000 to 23,500 S.H.P. Only a moiety at most of the increase in displacement is to be attributed exclusively to the machinery, the improved efficiency of the turbine adding to the power realised per ton of machinery. The remaining part of the greater displacement tonnage has been absorbed by the increase in the size of the vessel to accommodate the machinery. Still higher machinery powers are being adopted; indeed, arrangements are made for turbine machinery of between 35,000 and 40,000 S.H.P. to be fitted to destroyers and the speed is likely to be 35 knots. No fact establishes so effectually the great advantage of turbine machinery. The adoption of oil fuel for the boilers with its greater heat value, its ease in regulation, the facility it affords in "refueling" ship, and its cleanliness, has assisted the turbine immensely, and a further benefit is being derived from the use of superheated steam. It may, in short, be taken that the weight of the highest power installation mentioned including fuel for a given radius of action is now little more than that of a 15,000 H.P. installation in the coal-fired destroyers of ten years ago.

Influence of superheating the steam.

As to the influence of superheating the steam towards the attainment of such remarkable results, tests time and again have demonstrated that 10 per cent. gain in steam consumption may be realised by using steam superheated to the extent of 100 deg. F. On their fuel consumption test at half speed (15 knots), two destroyers of 935 tons displacement, and with machinery of the same power, gave remarkable results. In the one, steam superheated to the extent of 100 deg. F. was used, and the oil-fuel consumption was 34 tons per 24 hours against 43 tons in the vessel using ordinary steam; but it cannot be said that the resultant addition of some 20 per cent. to the radius of action was due entirely to the use of superheated steam. Other factors, the design of turbines, boilers,

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propellers, etc., entered into the account. Amongst the other elements was probably the attention devoted to auxiliary machinery. These are unavoidably large steam users, and it has been proved in practice that careful attention to insure that the power used, and consequently the steam consumed, are no more than are required has resulted in an appreciable improvement in the total fuel consumption. Withall superheated steam has great potentialities. In the Merchant Service the economy in fuel resulting in cargo ships from 180 deg. of superheat has proved to average 12 per cent. with triple expansion engines and 14 per cent. with quadruple expansion engines, as compared with the fuel consumption when saturated steam was used in the same types of engines. Various systems of superheating are now applied to over 1100 merchant ships, the collective power of the machinery being 1,959,000 indicated horse-power, and it is being adopted in several warships.

Effect of geared turbines on load.

As regards the turbine machinery, the feature of the year is the increased favour with which mechanical gearing is regarded, not only for naval, but for merchant ships, and this is a feature also limiting the influence of load on speed. The noise experienced in earlier ships has been eliminated by the greater accuracy attained by the improved methods of cutting the gear. The examination of gearing after long periods of working has increased confidence in the durability of the wheels and pinions. There was a lingering suspicion that these would wear and that there would result a great loss in transmission. Experience has, however, proved that wear is wholly a question of reliable material and effective lubrication. The steel used is of high ductility to withstand great shocks without fracture or deformation, and for this reason a carbon steel is now preferred to chrome nickel steel for the wheels; the tensile strength adopted is 30 to 35 tons, with an elongation of 26 per cent. in an 8-in. bar, while the pinions are made of a nickel steel of about 40 tons tensile strength with an elongation of 25 per cent. in a length of 8-in. As to lubrication, the oil most suitable is of such viscosity as to form a film, and it is kept free from grit by occasional filtration. If the oil be too heavy there may be loss in the bearing friction of the pinion. Examinations of gearing after prolonged working show no wear whatever.

High-power gear transmission.

Such mechanical gear is now being fitted for the transmission of as much as 15,000 S.H.P. through one shaft, so that its adoption in battleships, where a higher power per shaft is rarely applied, is only a matter of time. The gain is in being able to run the turbines at the high speed essential to maximum thermal efficiency, while at the same time reducing the rate of revolutions of propellers to give

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the best results with the screw. With this system of gear a much larger ratio of reduction is possible than with others: the range in use now is from 26·2 of the turbine to 1 of the propeller down to 4 or 6 to 1, the latter being suited for high-speed destroyers and light armoured cruisers.

Geared turbines.

Another gain is that the turbines may be run at such a high rate that the steam leakage loss becomes negligible. With short blades troubles have sometimes been experienced owing to the blade clearances being reduced to rather small an amount by some makers so as to reduce leakage losses. The gear system will eliminate such difficulties. The weight of the turbines, too, is decreased to an amount which more than counterbalances the weight of the gearing. Moreover, the system lends itself admirably to the reduction of space. The high and low pressure turbines may be placed side by side with their pinions engaging on the top of the gear-wheel on the propeller shaft, while the condenser is placed forward of the gear wheel and under the turbines, so that the low-pressure unit exhausts direct into the condenser without any eduction pipe. This also conduces to condenser efficiency. The geared turbines are working now with a steam consumption of about 11 lb. of saturated steam per S.H.P. per hour—a most satisfactory result. It is not, therefore, surprising that the power of geared turbines in use or under construction is already 634,000 S.H.P. Of all Parsons turbines, there were ordered during the year 1,016,520 S.H.P. for warships and 251,855 S.H.P. for merchant ships, while the total in service, or building, is for warships 9,372,300 H.P. and for mercantile steamers and yachts 1,635,290 H.P.

Other turbine developments.

The adoption of an impulse stage at the high pressure end of turbines is increasing in favour for warships. It confers the advantage that instead of having to admit steam simultaneously to all parts of the annulus in which there is blading, the steam is projected through a series of nozzles on to the ring of impulse blades, and as many or as few nozzles may be opened to the passage of the steam as are required by the proportion of full power needed for the speed of the ship at any time. As to alternative systems of speed reduction, described in previous issues of the *Naval Annual*, little falls to be added. The hydraulic system of Dr. Föttinger has not yet been applied in a British warship, but a large cruiser, some destroyers, and merchantmen are being fitted with it in Germany, and the results will be carefully considered.

Submarines of increased size.

As great an advance, proportionate to the size of ship, has been made in submarine boats as in any craft, and thus the task of the engineer has been greatly increased. This is due not only to the

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desire for higher speeds but for greater fighting equipment. In this respect Germany are making marked progress in size as well as in numbers. One of their vessels now nearing completion is of the following dimensions: Length, 214 ft. $1\frac{3}{4}$ in.; beam, 20 ft.; displacement on surface, 750 metric tons; submerged, 900 tons; reserve of flotation at surface displacement, 56 per cent.; speed on surface 20 knots, submerged 10 knots; H.P. of oil motors, 4000 B.H.P., working on twin screws. Russia, too, are building vessels of considerably over 1000 tons. Obviously other Powers must follow, and vessels of at least 1700 tons displacement and of high speed may be quite frequent in the near future. For a speed of $16\frac{1}{2}$ knots on the surface such vessels will require engines of 3000 B.H.P., while the electric motors to drive them when submerged at about 10 knots will not fall short of 1000 H.P. capacity.

Weight sub-marine engines

Internal combustion engines, using heavy oil, weigh about 75 lb. per B.H.P. apart from the electric machinery for under-water propulsion. As the demand is still for higher speeds, it becomes interesting to note that for 18 knots speed on the surface the power of the oil engines in a boat of 1700 tons displacement when submerged will require to be about 4200 B.H.P., and for 19 knots about 6000 B.H.P., the weights advancing from 100 tons in the $16\frac{1}{2}$ knots vessel to 140 and 200 tons respectively for 18 and 19 knots. This takes no account of the increase in size and displacement tonnage of the vessel to carry the heavier machinery, and of the augmentation in engine-power to ensure that the same speed will be realised notwithstanding the greater tonnage. Of course, the lengthening of the vessel would be at the midship section, and a slightly higher propulsive efficiency would result, but there would be an appreciable addition to the engine-powers given.

The French naval authorities are fitting oil-fuel boilers and Parsons geared turbines to several submarines now being built, and other Powers are displaying equal interest in this new development of steam machinery. Four of the turbine-driven submarine boats for France, building at Rochefort, are to be of about 900 tons displacement, and the turbine engines, driving twin screws through gearing, are to be collectively of about 4000 S.H.P. Two others, building at Cherbourg, are to be of about 950 tons displacement, and the twin engines in these cases will together develop 5000 S.H.P.—a power never before fitted in submarine boats. The arrangement of the turbines and gear will resemble that fitted on Channel steamers, with the condensers placed below the turbines. There will be electric motors for under-water propulsion, as in the oil-engine propelled turbines. The boilers, oil-fired, are of the water-tube type,

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with specially small tubes, containing less water than in destroyer boilers.

Oil engines *versus* steam turbines in submarines.

When one remembers that the weight of such geared turbine installations in torpedo-boat destroyers has been reduced to about 60 per cent. the weight of oil engines, it will be recognised that there is great inducement towards experiment in the direction of trying turbines in submarines. The difficulty experienced with the French steam-driven submarines of years ago in "closing down" the boilers is largely overcome by the superiority now of express water-tube boilers of rapid evaporative quality using oil fuel. The volume of steam or water in the boiler at any time is very small, and the supply of fuel to the furnaces can be instantly cut off, so that the time taken to "damp down" may not be much greater than that taken at present to change over from oil-engine drive to electric drive and otherwise to prepare the vessel for diving. On the other hand, there may be disadvantage in respect of visibility in the case of steam-driven boats when awash. Not only might the funnel or other medium for discharging products of combustion be visible, but there is always difficulty in preventing smoke issuing from boiler furnaces. In any case the results of the trial of turbines in submarines will be watched with keen interest in more than one maritime nation.

Effect of guns on submarine's size and speed.

But in addition to the demand for higher speeds in submarine boats there is the desire for augmented fighting power. With two torpedo tubes the A boats of the British Fleet were of 204 tons displacement submerged, the B boats of 313 tons, the C boats of 321 tons, while with three tubes the D boats were of 604 tons; but the speed remained constant—13 knots on the surface—so that the engine-power increased only slightly. The E boats had four or five tubes and a disappearing 12-pdr. gun, and they were designed for 15 knots, the displacement tonnage submerged advancing to 800 tons. In a 1700-ton ship it will, no doubt, be found possible to get the speed of 16½ knots, while carrying an increased number of tubes for firing torpedoes and more 12-pdr. guns. But as the trend is for larger guns it may be justifiable to speculate, on the basis of the data already given as to the large German and Russian boats, on the increase in size and especially in engine-power, to ensure the 16½ knots with guns of greater power and range, were such deemed desirable by tacticians. Apart altogether from the increase in tonnage and in the engine-power there is the disadvantage that the carrying of larger guns—of 4-in. or 6-in. calibre—would require a higher superstructure for housing them, whereby the visibility of the ships when awash would be greater at longer distances. But that is a military point, and here consideration is had only to the engineering

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phase of the question. Four guns of 4-in. calibre, instead of the same number of 12-pdrs., with ammunition would involve directly an increase in weight of armaments of 10 to 12 tons, and the use of the same number of 6-in. guns an addition of 78 tons. Such weights would directly involve in the hull alone a much higher tonnage, and thus the 1700-ton vessel would for 12 tons more gun weight become an 1800-ton vessel, while for the 78 tons for 6-in. guns the displacement would become 2000 tons. The power necessary to get the same speed—16½ knots—would be 3800 B.H.P. in the former case and not less than 4000 B.H.P. in the latter case; the weight of the machinery would go up from 100 tons to 128 tons and 134 tons respectively, with oil engines used for propulsion on the surface, the speed of the vessel being, as stated, constant.

There is no mechanical difficulty in realising these powers in two sets of oil engines driving twin-screw propellers. So far the greatest number of cylinders in each engine in submarine boats has been eight, and the power per cylinder 170 B H.P. on the two-stroke cycle and 100 H.P. on the four-stroke cycle. Still higher powers are being aimed at in machinery now being built for submarine boats. Moreover, it would be quite feasible in these larger submarines to have three sets of engines driving treble screws, and thus, with twelve cylinders on each, and without going to larger diameters than that for 170 B.H.P., to realise powers up to 6000 B.H.P. It must not be assumed, however, that 170 B.H.P. is the limit; far from it. In merchant ships the power per cylinder has gone up to nearly 400 B.H.P., but the conditions within submarine boats are much more severe. The stroke of the engine must be minimised because height is limited; it is little more than half that in merchant ship engines. The revolutions of the engines in the latter are usually not over 250 per minute, whereas in submarine boats they sometimes number 450 to 500 per minute. The greater frequency of the alternations between very high temperatures (nearly 3000 degrees F.) and low temperatures involves difficulties from this standpoint. The troubles on this score increase in some measure with the diameter of the cylinder; but, in the demand for increased power, larger cylinders working in warships with a short stroke must come, and this will require most effective cooling of the cylinders and valves. There is some difference of opinion as to whether heat troubles are greatest in high speed relatively small engines or in low speed relatively large engines. In the former, as stated, there are rapid alternations, while in the latter, although the heat in the metal is greater *per se* owing to the large size of cylinder, there is danger due to the long continuance of each "dose" of heat: the temperature of the metal surface is raised and

Sub-marine oil engines.

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lowered more at each stroke; the strains are greater. The four-stroke cycle was primarily adopted to minimise the temperature troubles, but now that experience is overcoming the difficulties the two-stroke cycle engine is increasing in favour.

Progress with the Diesel engines: their future.

Before passing on to consider aerial ships it may be said that not only are the advantages, tactical and otherwise, of the internal combustion engines for surface ships, as enumerated in previous issues of the *Naval Annual*, being more widely recognised, but progress is being made, especially in this country, towards the solution of the practical difficulties in the manufacture of large-power engines for large ships. Excepting for submarine boats, no engines of the type have been definitely ordered, so far, for any ships of war of any importance or size. In Germany work is continued on a 12,000 H.P. engine in 2000 H.P. cylinder units; but the engines have not been run on extended trials in the shops, and until that is done no decision will be come to as to the fitting of them in a warship. Experimental work for practically all the leading naval powers continues, and as much as 1000 B.H.P. per cylinder has been realised on prolonged trials. There seems to be considerable hesitancy in placing complete reliance on oil either for raising steam or for working engines directly owing to the high price of oil. What seems lacking is a steady market with assured prices over a long period of years. It is true that this may be realised by contracts being entered into over a lengthened time; but this is not always convenient. The recent rise has disturbed confidence in the future. Moreover a larger volume of oil in store in this country and at coaling stations is required. Probably with the completion of the many oil-carrying steamers now on order freight rates will be reduced, and with more abundant supply in sight greater market stability will be attained. Some of the oil companies, even in their oil-carrying ships, still hesitate to adopt the Diesel engine, and others, like the East Asiatic Company, who are thoroughly convinced of the economy of the system, are still putting steam engines into such of their vessels as are not employed on routes contiguous to oil fields. At present the number of sea-going merchant ships, built or building, with Diesel engines is seventy-one, the collective power of the machinery being 103,950 B.H.P. A year ago the number was forty-eight with a total of about 60,000 B.H.P. The weight of the machinery varies very considerably—from 160 to 340 lb. per B.H.P. —but there is little incentive to reduce weight in the machinery of the Mercantile Marine. The fuel consumption continues favourable —about ½ lb. per B.H.P. per hour for all purposes—but with steam engines and a coal consumption of 1·3 lb. there is no gain at present,

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since oil is at nearly 80*s*. per ton, except at points along the oversea line of distribution of the oil supplies. Some firms, for instance, have had to pay over 85*s*. per ton for the oil used as fuel for torpedo-boat destroyer trials.

As intense interest is being taken in airships, and as there is, on the part of all the principal nations, a desire that these should be as effectively armed as possible, consideration may next be given to the influence of load on their size and speed. There are certain known factors. The possible load is dependent upon the cubical capacity of the balloons, and the proportion is constant, irrespective of the type of ship—about 31,000 cub. ft. per ton. It becomes a simple calculation to determine the capacity and size of the ship when the load has been settled, but it is necessary, in fixing the fighting requirements, to remember that there is, consequent on the direct increase in the load due to guns, additional load owing to the larger size of ship necessary to accommodate greater weight, more men, and more powerful machinery to ensure the same speed. Even this augmentation of engine-power reacts on the the weight of the ship, since increased cubic capacity of balloons must be provided. The guns now being made for airships are of the rifle calibre and the 37 mm., or 1-pdr., automatic type. The most suitable form of the first-named weighs 80 lb. and of the second-named 400 lb. Were one of each calibre with a moderate allowance of ammunition to be fitted to an airship of 670,000 cub. ft. capacity, the weight directly due to the armament would be only 6 cwt.; but as the ship would require to be larger and the engine-power greater, the gross addition to load would be 1½ tons, which in an airship is a serious item. To get the same speed the engine-power would have to be augmented to the extent of 25 per cent. Airships.

If we assume that, instead of one gun of each type, the strategist required four of each type, in addition to a moderate number of bombs, it becomes possible to state approximately the great increase in power required to drive the ship. Certain constants have to be assumed—say, a speed of about 50 miles an hour, and a radius of action of 1200 miles (24 hours' flying). The weight of the armament works out at about 3 tons, but because the lifting capacity has to be greatly augmented, and the structural strength of the ship increased, the engine-power must be doubled, becoming 1100 B.H.P. The gross result is that the balloons must be increased in capacity from 670,000 cub. ft. to 1,175,000 cub. ft. to augment the lifting power from 21·5 to 37·5 tons. The length would then be advanced from 500 to 600 ft, and all this to compensate for an increase in armament and ammunition only from 6 cwt. to 3 tons. Effect of gun load on airship.

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Rigid and non-rigid types.

These figures are for the rigid type of airship as adopted in Germany. The non-rigid ship carries a slightly greater load for the same cubical contents of balloons, because the structure is not of the same relative weight; thus less power is involved for the same speed. Taking typical German designs—one large and one small ship of both the rigid and non-rigid type, each with a radius of action of 24 hours at full speed — the particulars may be tabulated as follows:—

PARTICULARS OF DESIGNS OF AIRSHIPS OF DIFFERENT TYPES AND SIZES.

—	Non-rigid Type.		Rigid Type.	
Displacement	14·5 tons	40 tons	21·5 tons	60 tons
Cubic capacity	440,000 c. ft.	1,220,000 c. ft.	670,000 c. ft.	1,900,000 c. ft.
Length	400 ft.	560 ft.	500 ft.	700 ft.
Diameter	50 ft.	70 ft.	50 ft.	70 ft.
Crew	7	16	12	24
Rifle-calibre guns . . .	2	6	1	6
Rounds of ammunition .	1000	8000	200	6000
37-mm. guns	2	8	1	8
Rounds of ammunition .	200	1000	50	800
Weight of bombs carried .	8 cwt.	1 ton 14 cwt.	—	1 ton 8 cwt.
Total weight of armament.	1 ton 4 cwt.	6 tons	6 cwt.	5 tons
B.H.P. of engines . . .	500	1000	560	2200
Speed (miles per hour) . .	48	60	48	60

It is thus obvious that the addition of 4 tons 16 cwts. to the weight of armament in the non-rigid ship involves an increase in the displacement of 25·5 tons, but that owing to higher propulsive efficiency, the addition to engine power is not in the same ratio; while in the rigid ship an addition of 4 tons 14 cwts. to the weight due to fighting requirements results in an addition of 38·5 tons to the displacement, and the multiplication of power by four. In other words, in the 14·5-ton non-rigid ship the armament load is 8·3 per cent. of the total weight, the fuel for the 24-hour radius of action 22 per cent., and the engines 21 per cent.; while in the 40-ton ship the armament absorbs 15 per cent., the fuel 26 per cent., and the engines 18·2 per cent.

Airship engines.

There has been great progress in the construction of airship engines; makers in this country now take their place amongst the most successful manufacturers. Engines up to 350 H.P. are now being manufactured, the weight, including all auxiliaries, being only about 10 lb. per B.H.P. The V type engine—that with inclined cylinders—is increasing in favour in this country for airships, although the vertical engine and the engine with radial stationary cylinders are still used. The first-named is reliable; but there are one or two problems yet to be solved definitely, in connection for instance with the cooling of the cylinders. Provided the size of the

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cylinder is small probably the exhaust valves alone need to be water cooled, the other parts being air cooled. An advantage of this type is that the crank case and bedplate are light and there is only one camshaft even for large powers. Immunity from breakdown is attained by having two magnetos, two cooling water pumps, and two carburetters.

Aeroplanes and seaplanes: Effect of gun load.

In the case of aeroplanes and seaplanes there has also been marked progress, not so much towards the attainment of a standard design—there is too little practical experience for that—but towards fuller recognition of the fact that, as the conditions differ materially from those in motor cars, the subject calls for additional treatment. In a car the motor only works for short periods intermittently at full power; in the aeroplane it must be constructed to continue at full power for many hours; the record for duration of flight in Britain is, so far, 8 hours 23 minutes. Weight must be minimised and reliability insured at all costs. Increase in the altitude to be attained, it must not be forgotten too, involves some increase in power to allow for the loss of volumetric efficiency at high altitudes. This again requires additional size and weight. Fighting requirements have called thus far for only a light rifle-calibre gun, and as it is located with its shield in front of the motor its weight is utilized as part of the structure, and for balancing, so that there is not much difference in the total weight for a given speed between the armed and the scouting aeroplane. The Vickers machine, with a rifle-calibre gun, has a 100 H.P. engine, which gives a speed of 45 to 70 miles per hour, and a lifting capacity at the rate of 450 ft. per minute; the weight is only 1760 lb., with 300 rounds of ammunition, fuel and lubricating oil for a 4½ hours' flight, and the gunner and pilot. A scouting machine of the same capacity would weigh about 1500 lb., and with the same motor power the maximum speed, under corresponding weather conditions, would be 100 miles per hour, and the rate of climbing 700 ft. per minute.

Aeroplane and seaplane engines.

As regards the engines of such craft, the radial type—with cylinders rotating around the crank shaft—seems still most preferred; usually seven cylinders, but in some cases even eleven, are fitted. The V type, however, is advancing in favour. The power of the engines ranges up to 120 B.H.P. From 10 to 15 H.P. per cylinder seems an average result, but in some purely vertical engines it is as much as 30 H.P.; a Mercedes engine with four cylinders developed 120 B.H.P. when running 1100 revolutions per minute. The weight in this case is 6·32 lb. per B.H.P., but in radial engines the weight is between 4 and 5 lb. per B.H.P., which must be considered highly satisfactory, leaving little room for improvement

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in this direction. The scantlings of the crankshaft are, of course, merely limited by consideration of stiffness, not strength. The water jackets are of sheet-iron, welded on, or of sheet-copper, pinned on. Much may still be done by reducing the thickness of the cylinder head castings. The barrel and pistons are sometimes of the thinnest steel, and the connecting-rods are all drilled out for lightness. The pistons are generally of steel, welded or bored from the solid, drilled for lightness, and with the minimum provision by way of bosses for carrying the gudgeon pins; there are only one or two piston rings. In respect of fuel economy not much progress has been made; in few cases is it less than 0·6 lb. of petrol per B.H.P.

Oil fuel.

It will be seen that in all types of crafts dealt with oil fuel is an important factor in counterbalancing the increase in size due to the load consequent on growing military requirements. In association with the higher efficiency in turbines, it has enabled the horse-power of the machinery to be about doubled without adding to the weight, and since the evaporation of the boilers has been greatly augmented, it has reduced the space required for the steam generating plant per unit of power, so that there is here a further effect balancing the tendency towards greater size of ship. In submarines, airships and aeroplanes, oil fuel for internal combustion in engines is indispensable. Thus there is justifiable anxiety in view of such great dependence upon a fuel which is mostly of foreign manufacture, and is to a large extent subject to some of the evils associated with monopolised supply. In order to enable the Admiralty to override price combinations in time of peace, and to come safely through military risks in times of war, the First Lord of the Admiralty recently informed the House of Commons that a three years' supply for the whole fleet in commission and for manœuvres is to be kept in store, and to be replenished from month to month, while there will be in sight in addition a year's war requirements.

Oil supplies.

Notwithstanding this, keen interest is taken in all efforts to extend our supplies from home and Imperial sources. The Scotch shale continues to yield on an average from each ton 23 gallons of satisfactory oil fuel, and provision is made for storage convenient to the Forth Naval base. The output is now considerably over 3,000,000 tons of shale per annum. This, if used solely for the Fleet, would go a long way to meet demands; but, apart from the demands for shale oil for other purposes, naval requirements are increasing, and already there are 166 vessels, including five battleships, sixteen light cruisers, 109 torpedo-boat destroyers, and thirty-six torpedo-boats, exclusively using oil for steam raising, in addition to submarine and aerial craft with oil engines, while eighty-

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nine additional vessels use alternatively coal or oil in boilers. Attention is thus turned also to our Oversea Dominions. Dr. Perkin has recently given, at the Royal Society of Arts, some information as to the oil resources of the Empire. Although the product in Canada has recently diminished, the Dominion promises to become a rich oil field, due to discoveries on the slopes of the Rocky Mountains and elsewhere; and the Admiralty, by legislative enactment, is to have the first call on Canadian output. Dr. Perkin stated that in New Brunswick there were shale-oil works, and that natural gas was used on the Intercolonial Railway for car-lighting and other purposes. Australia was not at all rich in oil, so far as was now known; but plenty of oil-shale occurred, chiefly in New South Wales, where the term "kerosene" was rather inaptly applied to a variety of torbanite—a cannel or bog-head mineral. The production of oil-shale in New South Wales had risen from 47,331 tons in 1907 to 75,000 tons in 1912. Oil-shale was also found in Queensland, in Southern Australia, and in Tasmania, but the oil finds were not important. The Taranaki oil wells in New Zealand produced 6720 gallons per week. Papua was promising as to oil. The largest sources of oil in India occurred in Burma, and the yield of the various oil wells there had risen from 173,400,000 gallons in 1908 to 245,300,000 gallons in 1912. Assam had since 1908 given over 3,300,000 gallons every year, the yield increasing to 3,747,360 gallons in 1912. Trinidad was, of course, famous for its asphalt lake, but recently oil-boring had likewise been very successful, and 250,000 barrels had been exported in the one year 1911–12. In Africa oil had so far not been mined in large quantities. Solid bitumen and holes filled with petroleum were met with on the Gold Coast and in Nigeria; in the Karroo the geological structure was favourable for petroleum, and oil-shale fields occurred in Natal. The oil fields of Egypt were also attracting attention.

The Empire's oil output.

Compared to other countries, the British Empire has an oil-production which is still small. The total output is at present estimated at 1,359,000 tons, of which India contributes about 1,000,000 tons. The aggregate represents 2·06 per cent. of the total oil production of the world, to which the United States contributes 63·63 per cent., Russia 18·2, Mexico 5·9, Roumania 3·72, the Dutch Indies 3·02, and Galicia (Austria) 2·14 per cent.

Storage.

For the storage of oil extensive tanks are being constructed contiguous to the Naval bases. Steel is generally being used for the tanks and the cost of 5000 ton units works out at 10*s.* to 12*s.* per ton of storage capacity, apart from land, pumps, etc. Fifteen oil tank steamers are being built for conveying the oil to the Fleet. The supply may be transferred to the warships while they are

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steaming; the oil tank vessel, while under steam, is attached to the warship by wire rope, from which is suspended the oil hose. The possible rate of "oiling" depends in part on the internal arrangement of the ship, but also in a great measure on the size of the hose. A 6-in. hose is the size which can most satisfactorily be handled, and the flow would be about 150 tons per hour, varying with the viscosity of the oil. For easy pumping, both in tank steamers and in oil fuel ships, it has been found desirable to fit heating apparatus. Some oils can be pumped at, say, 48 degrees to 60 degrees F., others are difficult to handle at anything below 100 degrees to 110 degrees F. Steam piping of 2-in. internal diameter, in zig-zag form, is fitted in the tanks, and steam is circulated through this, the discharge being filtered before being returned to the boiler. For heavy oils the ratio of heating surface in such coils to the contents of the tank is one square foot to 2·7 tons of oil. The cost of the installation works out at between 4*s.* and 5*s.* per ton of oil stored.

It will thus be seen that great ingenuity and resource is required to be exercised continuously by the naval engineer and constructor, as each new demand of the strategist places a tax on his experience and originality in design in direct proportion to the load involved in meeting such a demand. Although, for reasons which need not be stated, several examples of the influence of the loads due to these requirements are taken from foreign naval procedure, it can be accepted with confidence that our Admiralty officials are ensuring our supremacy in engineering science as well as in other departments of activity.

ALEX. RICHARDSON.

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CHAPTER VI.

Wireless Telegraphy in the Navy.

History and Development.

The undertaking of a chapter on naval wireless telegraphy found the writer embarked upon a difficult task. In the first place, naval wireless telegraphy, in common with other branches of the science of war, must retain much of its best and most interesting matter as confidential. Secondly, with every wish to give full credit on behalf of the Navy to those well-known scientists whose names must always be connected with the history of its early development, it is impossible within the limits of a short article to compare each step of the progress made in the Navy with that made outside the Service.

It is not easy, after this lapse of time, to recollect what credit is due from a naval point of view to papers published by Lodge, Popoff, Branley, and others. I can only say that, in my researches amongst old records for this article, I have only found mention of Hertz and Dr. Bose previous to September 1, 1896, when Marconi Hertz. is first mentioned. It seems obvious that the accounts of Hertz's wonderful demonstrations set several scientific brains to work, quite independently of each other, on problems which have since given wireless telegraphy to the world.

Naval officers, no doubt, have drawn many of their inspirations from the demonstrations which they witnessed from time to time, and from papers published by scientific men ; but in many important respects the Navy have been and I think still remain in advance of anything that has been demonstrated commercially. This is particularly true in respect of questions connected with syntony and resonance, both in transmission and reception of signals, and I consider that at the present moment naval practice is ahead of anything that I have seen elsewhere.

The Navy owes a great debt to Guglielmo Marconi—more Marconi. to him than to any other inventor—since it was his genius that gave us syntonic wireless telegraphy in its first practical form. Nevertheless, it is a fact that since 1904 the development of the art in the Service owes comparatively little to the influence of any one

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inventor in particular. The great efficiency which has undoubtedly been attained is rather the result of constant and combined effort on the part of naval experts to develop the work of the early investigators and apply it to naval requirements rather than to the individual effort of any particular genius, naval or other.

Sir Henry Jackson and Mr. Madge.

There are two names, however, which should always be remembered in connection with the development of naval wireless telegraphy. The first is that of Admiral Sir Henry Jackson, K.C.B., K.C.V.O., F.R.S., and the second that of Mr. H. B. Madge, expert in wireless telegraphy on board the Vernon. Sir Henry Jackson introduced wireless telegraphy into the Navy in 1895, and was responsible for its development until the year 1906, when increasing responsibilities obliged him to abandon active participation in its progress. Mr. Madge joined the Vernon in 1904. He is mainly responsible for the design of modern naval apparatus, and the undoubted efficiency which has been obtained is largely due to him.

It may not be out of place here to point out that naval officers have always had unequalled opportunities for experiment and research on practical lines. Even as early as 1901 there were nearly 100 sets of apparatus in use under the personal observation of skilled torpedo officers, and since that time the number of ships fitted and of officers specially trained in wireless telegraphy has steadily increased.

It has been my good fortune to have been in close touch with the development of wireless telegraphy since 1896, and it is, perhaps, interesting, first of all, to look back over the past eighteen years and to fix on the main events which have marked its progress in the Navy.

In the year 1895 Captain Jackson sent messages from one end of his ship to the other. That was the inception of naval wireless telegraphy. In 1896 Mr. Marconi introduced the aerial wire and its earth connection. Practical wireless telegraphy dates from this.

Marconi, De Forest and Poulsen.

In 1899 Marconi equipped three ships in the Naval Manœuvres, and demonstrated the extraordinary value and possibilities of his "jigger." This step marked the introduction of syntonic wireless telegraphy.

In December, 1903, De Forest gave a demonstration of wireless telegraphy between Holyhead and Howth. This demonstration marked the introduction of alternating current machines providing a note of definite pitch for transmission and of sound reading for reception.

From this point on, it may be said that naval wireless telegraphy proceeded on lines which were, in nearly all matters of detail, quite

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distinct from commercial practice, and if we except the introduction of continuous waves by Poulsen in 1906, it would be quite fair to say that modern naval wireless telegraphy owes very little to the direct inspiration of inventors outside the Service.

Once the governing principles of wireless telegraphy had been settled on definite lines, it is obvious that naval and commercial practice had come to the parting of the ways. Commercial wireless telegraphy has been developed on lines which make it adaptable for the purposes of general intercommunication. Naval wireless, on the other hand, seeks to render itself immune, as far as possible, from the competition of, and interference from, other similar communications. Having thus introduced my subject, I now propose to give a brief historical review from year to year of its development.

The Advent of Wireless.

It appears that the idea of employing Hertzian waves as a means of communication first suggested itself to Captain Jackson about the year 1891, at a time when the Navy was seeking for some means by which a torpedo-boat could announce its approach to a friendly ship. He was then at sea, and had neither the time, the apparatus, nor the opportunity to give his ideas any practical shape. Later on, when commander of the torpedo-school ship Defiance, in 1895, he happened to read of some experiments by Dr. Bose on the properties of coherers. These gave him a fresh impetus, and he immediately set to work to give his ideas a practical form. By the end of the year he had satisfied himself of the feasibility of communicating over a distance without wires. His experiments continued with increasing success during the spring of 1896. In July of that year he obtained a satisfactory filings coherer, and in August he sent Morse signals which were received by means of an electric bell. On September 1st he met Mr. Marconi, who had also commenced experimenting with Hertzian waves in 1895, at the War Office for the first time, and, on comparing notes with him, found that the results obtained and principles involved were similar in each case. From this date on, until Captain Jackson was appointed Naval Attaché in Paris early in 1897, the two inventors were in close touch, and appear to have mutually assisted each other in developing their invention.

1891-1895.

Jackson's early experiments.

The first official mention of wireless telegraphy in the Navy is to be found in the Annual Report of the Torpedo School of 1896, and the subject is introduced in the following words:

1896.

"A series of interesting experiments has been carried out by Defiance to ascertain if it were possible to transmit electric

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radiation to a distance without any conducting wires, the object being to provide a means by which torpedo-boats might indicate their approach or proximity to friendly ships. The Defiance had constructed apparatus by which Morse signals could be slowly transmitted and recorded at short distances; subsequently trials of apparatus by Signor Marconi, an Italian gentleman, were attended, and a brief summary of the results is given below. The principles on which Signor Marconi's apparatus were constructed were similar to those employed by the Defiance, but more fully developed, and the instruments themselves were much more sensitive."

Marconi's early apparatus. A short description of Marconi's apparatus then follows. It is stated in the report that he used spark balls placed in the focus of a flattened parabolic mirror. Signals appear to have been sent over a distance of 2 miles, and Marconi said at the demonstration that by putting one spark ball to earth and one side of the receiving tube to earth, he could enormously increase the range of the apparatus. He was hopeful of getting 10 miles by this arrangement.

1897. A long report was furnished by Captain Jackson in 1897, on his further experiments, and it is noted that the addition of an aerial wire and earth connection to both sending and receiving instruments had the effect of greatly improving the range of the apparatus. Full credit is given to Marconi for the introduction of these devices. Apparatus made on board the Defiance, and used in connection with a 6-in. spark induction coil, resulted in the establishment of communication over a distance of 5800 yards. The experiments were so successful, and the results promised to be of such importance to naval communications, that the Admiralty approved of a special grant being made for the purpose of manufacturing larger and more elaborate sets on board the Defiance for trial on board ships at sea. Captain Jackson got the grant, and was then sent to Paris as Naval Attaché, so that he was unable to continue his experiments.

1898. The year 1898 was chiefly noticeable for the experiments of Sir William Preece, then Engineer in Chief of the General Post Office, at Dover and a demonstration given by Marconi between Alum Bay, in the Isle of Wight, and Bournemouth, a distance of 14½ miles.

Preece. Sir William Preece's experiments were conducted between two stations about a mile apart, and the points specially commented on in connection with these trials are interesting in the light of subsequent experience. One was that better results were obtained when the sending and receiving wires were parallel to one another. This foreshadowed Marconi's subsequent patent for

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horizontal directional aerials. Another was that a good earth did not appear to be necessary, provided that a capacity plate laid on the ground at the foot of the aerial was used in place of an earth. This developed, later on, into the definite method of connection to earth through a capacity as adopted by Sir Oliver Lodge in his practice. A third point was the importance of keeping the sending and receiving aerials identical in all respects, which indicated the value of resonance or tuning.

In June Mr. Marconi showed good communication at ten words per minute over a distance of 14½ miles, using a 10-in. coil and a mast of 120 ft. height, and he then stated, though he did not demonstrate it, that he was able to send two messages at the same time which would not interfere with each other.

Naval officers reported at this time that the apparatus had not yet reached a stage at which it could usefully be installed on board a ship at sea, owing to difficulties of manufacture, however, rather than to difficulties of principle. The induction coils used were very inefficient and much affected by damp. Manufacturers had not yet begun to take an interest in the supply of suitable apparatus.

Adopted for the Fleet.

It was during the year 1899 that the Marconi Company fitted up three ships—the Alexandra, flagship, and the Europa and Juno, cruisers—for the Naval Manœuvres. Marconi's device, known as the "jigger," was used for the first time, and the range of the apparatus was increased from about 20 to 60 or 70 miles by its means. On the first day of the manœuvres the Europa was able to send a report to the flagship, over 80 miles away, using the Juno as an intermediary, and the apparatus on board the three ships worked throughout the exercises with great success. Captain Jackson, in one of his reports about this date, spoke of the "jigger" in terms of high praise. He called it "this beautiful and ingenious device." The direct result of this demonstration was the agreement of 1900 between the Admiralty and Marconi Company for the supply of thirty-two sets of apparatus.

1899. First use at sea.

It was not, however, until the year 1900 that wireless telegraphy received definite recognition in the Navy. That year saw it emerge from its chrysalis state and in a fair way to become a regular means of communication. At the end of that year forty-two ships and eight shore stations had been equipped with sets of apparatus which appear to have been in the main a compromise between those originally designed by the Marconi Company and others got out by

1900. Issue to Fleet.

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the Torpedo School at Portsmouth with a special view to meet naval requirements. It was recognised that naval and commercial developments of the science could not proceed on identical lines, and we find great attention being paid to any device which would render naval signalling immune from the interference of commercial work. It was noted, for instance, that a ship stationed at Cowes could read eithes the Marconi station at the Needles or the Torpedo School at Portsmouth without interference between the two sets of messages, and this caused naval experts to seek for types of apparatus which would render naval communications independent of those employed in the commercial world. Transmission was still by means of plain aerial, but reception had been greatly improved by the introduction of Marconi's "jigger" in the coherer circuit.

First Marconi agreement.

In July, 1900, an agreement was concluded between the Admiralty and the Marconi Company for the supply of thirty-two sets of Marconi apparatus, and it is interesting to read the test which had to be passed before the sets were accepted. Two ships were stationed, one at Portsmouth and the other at Portland. The height of the mast on each ship had to be at least 162 ft. above the netting (about 180 ft. above the water-line). Signals had to be exchanged at not less than ten words per minute when the apparatus was worked by naval signalmen. All the thirty-two sets passed the test without difficulty, in spite of the fact that 15 miles of the total distance of 52 miles was over land.

Captain Robert F. Scott.

Wireless telegraphy was used extensively for the first time in the Naval Manœuvres of 1900, six ships being fitted, and the Admiral commanding the Channel Squadron made strong representations of its extreme value to the Navy as a result of his experiences. The late Captain Robert Falcon Scott was the torpedo lieutenant of the flagship at the time, and the Admiral paid a special tribute to his zeal and ability in organising and directing the service. He also called attention to the desirability of introducing legislation for the protection of naval interests in respect of wireless telegraphy and for the avoidance of interference between naval and commercial signalling.

Use on the Cape Station.

This same year saw four sets of Marconi apparatus sent out to South Africa by the War Office for use during the war; but, owing to the lack of adequate means to raise the aerials, it proved of no service to the army in the field, and was presently installed and worked by the Marconi engineers in the men-of-war patrolling the coast. The commanding officers of those ships reported strongly in favour of its adoption by the Navy, and testified to its great utility on many occasions.

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Captain Jackson, who was then serving in the Vulcan, in the Mediterranean, reported at considerable length on matters relating to syntony and tuning. He laid great stress on the fact that by means of careful tuning he was able to establish communication between the shore station at Malta and the storeship Tyne, at a distance of 134 miles. He also recommended the adoption of two special wave lengths for naval purposes, which would be independent of each other. Another interesting feature of the year was provided by reports from various officers on the effect of atmospheric discharges on the receiving apparatus. Difficulty in adjusting the receiving apparatus at times had been noted previous to the 1900 manœuvres, but it was not until a considerable number of apparatus were employed under supervision in the same area that the origin and source of the disturbances was made quite evident. A comparison of the experiences of the various officers in the Channel Fleet showed that these disturbances were of a definite character and were due to natural causes.

Observations on atmospherics.

Advance in Practice.

1901.

The year 1901 was notable for the fact that six shore stations were completed in July on the south coasts of the United Kingdom, namely, at Dover, Culver Cliff, Portland, Rame Head, Scilly Islands, and Roches Point. Proposals were also made and approved by the Admiralty for the provision of over 100 sets of apparatus as soon as they could be designed and manufactured for installation in the Fleet.

In February Marconi gave the Navy an important demonstration between Poole and Niton, at which two separate messages were despatched simultaneously on the same aerial at Niton, and were recorded on two separate receivers connected to the aerial at Poole.

Jackson's syntonic system.

Captain Jackson continued to be occupied with questions relating to syntony and resonance, and in March of this year he despatched a long report from the Vulcan, in the Mediterranean, relating his experiences over an extended period, and describing his new syntonic method of transmission. This he strongly recommended for adoption in the Navy on the ground that high insulation of the aerial was not necessary, and that a much finer degree of resonance between the sending and receiving circuits was obtainable. He reported that in the case of ships already equipped, the necessary additional apparatus could conveniently be constructed by the artificers of the ship. The effect of horizontal aerials was also inquired into by torpedo officers, but no mention is made of any directional results being obtained. The claims of several torpedoes controlled by wireless were

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investigated, and one designed on board the Defiance was actually under trial, but the idea was abandoned owing to the objection that they were all liable to misdirection by an enemy.

Advantage was also taken of the Ophir's passage through the Mediterranean, with H.R.H. the Duke of York on his way to India, to carry out elaborate tests of the efficiency of the existing organisation of wireless telegraphy in the Mediterranean Fleet.

1902.

Lodge-Muirhead system.

The following year was notable for a demonstration of the Lodge-Muirhead system at Elmers End, and a trial of Marconi's magnetic detector. The latter was not recommended for adoption in the Service on the ground that it gave no permanent record.

It is curious to read of this decision now in the light of modern practice. As far as my recollection goes, wireless experts themselves favoured sound reading from the outset, but their recommendation was overruled by senior officers, who distrusted a message the accuracy of which depended solely on the physical skill of an operator, and of which there was no ocular record or proof. Sound reading was not actually introduced until 1904.

Although this year gave but little external evidence of the progress of the science, it was an extremely busy time for the torpedo schools. It was fully recognised that a syntonic system of wireless telegraphy was essential before any real progress could be made in tuning. The difficulty lay in finding something that was as simple and effective as plain aerial. In those days there were no such things as wave meters or other devices for tuning up a syntonic set of apparatus, and though excellent and promising results were being obtained on board the Vernon, in the direction of the use of syntonic apparatus and two or more wave lengths, it was not found practicable, owing to manufacturing difficulties, to supply tuned apparatus to ships at sea.

1903.

Another important step was taken in 1903, and an agreement was made between the Marconi Company and the Admiralty for the use of patent rights and the supply of apparatus. The Admiralty attached great importance to Marconi's patent for the aerial wire, and also to his patent for tuning, since become celebrated in wireless circles as the "four sevens" (7777).

The second Marconi agreement.

It was obvious that of the many wireless telegraph patents that had been taken out by inventors, some must be valid, and though none at this time had been contested, it was only a matter of time for an action to be brought against the Admiralty, as the chief user of the means of communication, for infringement. The Marconi Companies were at this time practically the only parties engaged in commercial business, and, as a matter of fact, pressed the Admiralty

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very hard for infringement in respect of all sets of wireless telegraphy installed in the Navy in excess of the thirty-two sets originally covered by the agreement of 1900. By the agreement of 1903 the Marconi Company undertook to allow the Admiralty the use of all their patents then in existence or which might come into existence between then and the date of the expiry of the agreement in 1914. The Company also undertook to hold the Admiralty indemnified against any patent actions which might be brought against them by other parties in respect of patents claimed by the Company.

Introduction of Tuning.

Concurrent with the signing of the agreement was the introduction into the Navy of the Marconi tuned system. Plain aerial was definitely abandoned, except in cases of emergency, and its place taken by apparatus which produced two distinct wave lengths known as the "A" and "B" tunes. Marconi "A" and "B" tunes.

These two tunes, in good average hands, proved wonderfully satisfactory. "A" tune, the shorter, had a range of about 50 miles over sea, and "B" tune, the longer, a range of about 80 miles. The two could be worked independently of each other amongst ships separated by only a few miles. The objection to them lay in the fact that they were also the "tunes" used by the commercial ships and stations; but as these were comparatively few and far between, the inconvenience was not very much felt at the time of introduction, and during the following year nearly all the ships fitted with wireless were supplied with these tunes.

December of this year was notable for a demonstration given by De Forest between Holyhead and Howth, which led to very important changes in naval policy. De Forest used an alternator for transmission and an electrolytic detector for reception. He demonstrated that with his arrangements a speed of thirty words a minute was practicable, as compared with the ten or fifteen words per minute attainable with the Marconi coherer then in use, and that reception by sound had great advantages in accuracy over a tape record in cases of interference by either atmospherics or the working of other stations. The officers who attended the demonstration made a strong recommendation in favour of the adoption of alternators and sound-reading, together with the establishment of classes for the training of selected signalmen in sound-reading to work the apparatus. De Forest demonstration.

A very important year in naval wireless telegraphy was 1904. It was recognised that commercial apparatus and commercial methods neither fulfilled naval requirements nor were developing as fast as 1904.

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it was considered they should do, and a special experimental staff was accordingly formed on board the Vernon to devise suitable apparatus on original lines. A programme of subjects for immediate investigation was decided on, which included, amongst other things, alternators for transmission, detectors for telephonic reception, and an attack on the problems connected with the use of comparatively long and varied wave lengths.

By the end of the year a Naval Service set of apparatus had been designed, which, although not discarding the coherer entirely, introduced the magnetic detector for the reception of signals. A wave-meter was also designed, and the work in connection with this led to the measurement of the two waves emitted by a coupled circuit. The existence of two waves had already been predicted on mathematical grounds by Lieut. Yeats-Brown, but it was not until a sensitive wave-meter was available that their presence was actually demonstrated.

Introduction of the wave meter.

Although the great future possibilities of wireless telegraphy for naval purposes had never been seriously doubted, it was not until this year that it really began to take up its position as a practical means of communication between the admiral and his fleet. Additions were made to the wireless staff in the Vernon, and the experimental work carried out during the next few years put the Navy in a position second to none as regards a knowledge of the theory and practice of the new science.

Looking back now, it is interesting to note that in 1904 the Vernon had designed a most efficient wave-meter, with which the two waves radiated from a tuned system were measured, had proved the advantages of roof aerials for long waves, were already using alternators and transformers in place of induction coils, and had invented a method of selective receiving that was much in advance of commercial practice.

1905.

As an example of the selectivity of the circuits in use at this time, it may be mentioned that in 1905 signals from a station 170 miles away were read in the Vernon from an aerial on one mast, while messages were being exchanged with a ship in Portland—50 miles away—on another aerial on the other mast, 220 ft. distant. That is to say that, in the same ship *transmission* on one wave length to a distant station was carried on simultaneously with *reception* from another distant station on another wave length.

Simultaneous reception and transmission.

Increase of Specialised Staff.

The progress in material was so rapid that great difficulty was experienced in training a sufficient number of officers and men to

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keep pace with the number of ships being fitted, and this although over 300 officers and men passed through courses of instruction at the schools in 1905. This difficulty was unavoidable, as by 1905 all ships larger than destroyers were being fitted, and there had been neither the time nor the opportunity for all the operators required to gain the experience in practical work which was necessary for obtaining the best results from the apparatus provided.

In 1906 it was decided to form a telegraphist branch in the Service. Up to this time the operating work had been carried out by signal and torpedo ratings, and although the work had been admirably done, it was apparent that the number of these ratings which could be spared for this purpose could not possibly be sufficient for the number of ships being fitted. It was also evident that the rapid advancement of the science required a specialised *personnel* owing to the necessarily complex organisation required for this means of communication, and to the fact that it is always in the power of one or two inefficient operators to seriously prejudice the communications of a fleet. 1906.

Accordingly it was decided to commence the specialised training as soon as the boys joined the Service, and classes composed of suitable boys were formed in the Impregnable, the boys' training establishment at Plymouth. At first a proportion of Post Office messenger boys were included in these classes, but the arrangement was not wholly satisfactory, and was soon abandoned. It was necessary, of course, to tide over the years before the new branch was completely made up of ratings who had started their career as boy telegraphists, and for this purpose a number of selected signal and other ratings were allowed to turn over to the telegraphist branch and at the present time all the higher grades are composed of those selected men who were successful in passing their examinations at the end of the courses of instruction in the Vernon and Defiance. Method of recruiting.

The wireless schools, with the exception of the boys' school in the training ship, have been throughout a part of the torpedo schools, and the apparatus in ships which carry torpedo lieutenants has been under the charge of that officer. In other ships a naval or marine officer who had qualified in the subject was detailed for the duty, and, in addition, each Admiral had a specially qualified naval or marine officer appointed to his staff as the wireless officer of the fleet. Wireless schools and staff.

The organisation and training of the new telegraphist branch necessitated a considerable increase in the staff and apparatus at the schools, but this expansion was in no way allowed to interfere with the progress of experimental work or of the issue of improved

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apparatus to the fleets; in fact, the experimental and testing arrangements in the Vernon have been continuously expanding ever since the introduction of wireless telegraphy into the Service.

In addition, a great deal of experimental work has always been carried out in the fleets at sea, and in this connection it is interesting to note that there were reports from the Mediterranean Fleet, at the beginning of 1906, describing the practical results obtained with directional aerials similar to those used by Marconi before the results which he had obtained were known in the Fleet.

1907. International Wireless Convention.

In 1907 the International Convention relating to wireless telegraphy was ratified by Great Britain as a result of the first International Conference held in the previous year. By this Convention, commercial wireless stations were debarred from the use of wave-lengths between 600 and 1600 metres, so that the navies of the world could avoid interference with, or from, commercial signalling by using wave-lengths between these limits, but in no other respect did the rules laid down by the Convention directly affect naval wireless telegraphy.

High-power stations.

About this time more powerful sets were being designed and introduced into the Service for the larger ships, and a long-distance station at Horsea Island, in Portsmouth Harbour, was designed and erected for experimental purposes and for communication with ships and the somewhat similar stations which were later to be installed at Cleethorpes, Gibraltar, and Malta. The Gibraltar station calls for special mention, as the aerial is suspended from the top of the Rock, which is over 1300 ft. high, instead of from the usual costly system of masts or towers.

In addition to the introduction of high-power installations, standard low-power sets were being introduced for destroyers and other purposes. Wireless had been fitted in destroyers some years before, but the shortage of operators had delayed its general introduction on board this class of vessel. High or musical note transmitters were in general use in the Navy by the end of this year.

The following year, 1908, is chiefly noticeable for extensive comparative experiments with electrolytics, valves, crystals, and other sensitive receivers, and in 1909 the high-power stations at Cleethorpes and Gibraltar were completed.

1909-1914.

Subsequent to 1909 I am unable to point to any notable improvements or radical changes of general interest, as all later developments are still considered as confidential. Some idea, however, of the increasing importance attached by the Admiralty to this means of communication may be gathered from the fact that on board the Vernon alone there are now about twenty officers whose duties are

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appropriated solely to wireless telegraphy, as compared with the three or four who were employed in the school in 1904, whilst the number of trained operators in the Fleet in 1912 stood at over 1100. Similarly it is of interest to note that at the end of the year 1900 there were forty-two ships and eight shore stations equipped with wireless telegraphy in the Navy, and that at the end of the year 1913 these figures have increased to 435 and thirty respectively.

A great deal of attention has been given recently to the problems of wireless communication with submarines, airships, and aeroplanes.

In the case of submarines, communication can be maintained so long as the vessel remains on the surface, but when once totally submerged it appears impossible to establish any connection with the outside world by means of wireless telegraphy.

In the case of airships, communication is fairly satisfactory, though the ranges obtainable are not great, compared with the radius of action of these air-craft. Airships and sea-planes.

The main problem, however, to be attacked in the immediate future appears to be the maintenance of inter-communication with a moving aeroplane at ranges of 30 or 40 miles. So far, signals can only be sent *from* the aeroplane, as owing to the noise of the engine exhaust, the rush of the air, and other causes—such as vibration—it has been impossible to instal apparatus for the satisfactory reception of signals. Some degree of success has, however, been achieved, and experiments are in progress with sound-proof helmets and other devices, which promise a reasonable degree of success. It is also anticipated that the various inventions which have been introduced of late for amplifying the strength of the signals in the telephone receiver will have an important bearing on the solution of this problem.

Wireless Telephony.

Wireless telephony, too, has been under regular observation since 1909, but, in spite of considerable improvements, it has not so far obtained a degree of reliability which would justify its adoption for fleet work. It would seem to offer an ideal form of short-distance communication for use between the ships of a fleet, and it cannot be denied that the suggestion that an admiral should be able to converse directly with his officers when under way is very attractive. Wireless telegraphic communication, however, especially over short distances, has obtained such reliability, and has, moreover, proved so satisfactory in practice, that some natural hesitation is felt before either making a change or adding wireless telephony to an already complex organisation. Telephony in the Fleet.

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Wireless telephony has its own peculiar disadvantage as compared with wireless telegraphy. It is true that a skilled telegraphist may not be required to work it, but in the case of a highly-trained and organised service like the Navy, this objection is not of great importance. On the other hand, telephony is not, on the whole, so accurate a means of communication as telegraphy, owing to the differences in articulation and pronunciation which exist amongst various individuals. Except, too, in the case of an actual conversation between individuals, the additional speed obtained in words per minute by the use of the telephone, as compared with the telegraph, is illusory. In transmitting a message to an operator, which has to be committed to paper, the speed is in each case determined by the rate at which the operator can transcribe the message in longhand, and a skilled telegraphist can read Morse signals as fast as he can write them down. There is little doubt, however, that since wireless telephony possesses the peculiar advantage of personal conversation it will, in due course, be adopted in the Navy for certain specific purposes; but it is doubtful whether it will ever take the place of telegraphy in cases where instructions or reports have to be recorded upon paper by an operator.

Telegraphy and telephony compared.

Range of Stations.

No article on wireless telegraphy would be complete without some general remarks on the range of stations, and the general effects of atmospherics, or X's, as they are usually called.

Installations of 1899 and 1913 compared.

In 1899 and 1900 it was not unusual to obtain day ranges of 100 miles between ships at sea with the, comparatively speaking, very inferior installation then in use. The apparatus installed on board ships at that time consisted of an induction coil giving a 10-in. spark in air and consuming about ¼ kilowatt of electrical energy. The aerial consisted of two wires led straight up to the masthead, outside the rigging as far as possible, and the detector was Marconi's coherer. Only one wave-length was employed. At the present moment, with much more power available and far more sensitive detectors, the day range of ship installations may be as much as 500 miles.

Modern ship apparatus employs high-frequency alternators varying from about 2 kilowatts up to 10 or 15 kilowatts, according to the size and employment of the ship. The aerial consists of a cage, sometimes two cages, of eight wires suspended between the masts and extended for some distance towards the bow and stern. The detectors used are of the crystal type, with the Marconi's magnetic

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detector as a "stand-by." Six or eight different wave-lengths are employed for the various purposes of the communications.

A great advance has been made in the reliability of the signals. In 1900 the messages sent were few and confined to those of importance which could not be sent by visual signalling.

The cruisers were kept comparatively close to the fleet, and, if spread, special arrangements had to be made to keep the line of wireless communication clear. Owing to the imperfection of the apparatus, and its liability to disturbance by atmospheric discharge or strange signals, messages took a long time to send owing to repetitions and difficulties with the recording apparatus. To-day the situation is very different. Communication by wireless telegraphy is far more rapid and reliable than by any form of visual or sound signalling. An admiral in European waters can *receive* instructions from his base, no matter where he is, through one or other of the high-power stations. He can inter-communicate directly with his base at ranges of 500 miles or more by making special arrangements, and he is always in direct touch with any of his ships at distances up to 500 miles, according to their size. Fleet communication.

The range of a wireless installation by day is fairly constant, but, for all that, it is one of the most difficult of things to define, as between any two ship stations at sea it depends on the size of the ships, the height of their masts, the power used, the sensibility of the detector, and last, but not least, on the skill and acuteness of hearing possessed by the receiving operator. At night there is added another complication generally referred to as the "night effect," which enables signals to be sent from a small installation to most astonishing distances after sunset. Ships are usually equipped with apparatus that can signal reliably at least 200 miles, usually 300. To get ranges in excess of this distance, power has to be added quite out of proportion to the additional mileage obtained, owing to the fact that the size of ships' aerials is necessarily limited. In practice, 500 miles seems at present to be about the limit of reliable range for ordinary ships. At night, however, and particularly in a north and south direction, these ranges are doubled and trebled independently of the power employed. Communication at night.

My first personal recollection of these exceptional night ranges dates back to 1903, when it was found that the wireless stations on the south coast of England were occasionally able to hear and even to communicate with ships on the west coast of Spain. This was in the days of the coherer, and before the introduction of telephonic reception. To-day the small coast stations in England can hear and exchange signals with similar stations in the Mediterranean almost

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any night throughout the year, if they desire to do so, although the range of such stations may be no more than about 100 miles in the daytime.

Interesting anecdote.

A most striking instance of the possibilities of long-distance ranges at night occurred in 1907. The occasion was an official dinner-party on board the Exmouth at Portsmouth. During the progress of the meal a telegram was handed in from the Admiralty, announcing Sir A. K. Wilson's promotion to Admiral of the Fleet. It was suggested that the news would be of great interest to Admiral Prince Louis of Battenberg, who was then at sea in the Mediterranean with his fleet, but whose position was unknown. The flag-lieutenant offered to try and send the news by wireless, with the result that in less than ten minutes a message of congratulation was received by Sir Arthur Wilson at the dinner-table in Portsmouth Harbour from Prince Louis at sea somewhere in the Mediterranean.

It was said afterwards that this very practical demonstration of the possibilities of wireless had no little effect on the sum appropriated for the purpose in the next Naval Estimates.

The longest freak range which ever came under my personal observation was in 1911, when the wireless station at Hunstanton intercepted a message from a German ship giving her position as 300 miles south-west of Cape Blanco, a distance of at least 2400 nautical miles. The operator even reported that the signals were very strong.

Atmospherics or X's.

Atmospherics, or X's, are the most serious difficulty experienced in wireless telegraphy, and probably more time and attention has been given to the problem of their elimination than to any other. The special difficulty they give rise to is easily explained. A receiving aerial system can be designed to oscillate to one particular wave-length to the practical exclusion of all others, but an atmospheric is too often a purely local effect, and causes the aerial system to oscillate with its own period; consequently no alteration of the local receiving tuning arrangements makes any difference—the circuits still oscillate to the local disturbance, and the desired signals of the distant station are blurred.

In the north of Europe atmospherics are usually most prevalent in July, August, and September, and least so in January, February, and March. In 1910 I caused a record to be kept for a year at one of the coast stations in the Channel of all atmospheric disturbances. For convenience I divided them up into three groups, namely:—

Moderate	Signalling unaffected at normal ranges.
Strong	Signalling difficult at normal ranges.
Violent	Signalling impossible at normal ranges.

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The result is interesting as indicating their effect on wireless communication at the time, and was as follows:—

Month.	Moderate (hours).	Strong (hours).	Violent (hours).	Total.
January (best month) . .	Nil	Nil	½	½
September (worst month) .	27	42	94	163
Total hours for year . .	222	285	385	992

That is to say, that during this year with the apparatus then in use the operators at the coast station estimated that there were 385 hours during which wireless communication at normal ranges was absolutely impossible owing to atmospheric disturbances. I have no personal experience of atmospherics abroad, but it is well known that there are places, especially in the tropics, where wireless communication is absolutely impossible for hours together during certain seasons of the year.

Accidents and mishaps.

Accidents arising from shocks through the aerial system are fortunately extremely rare, and, in fact, I cannot call to mind a single serious case. I have often seen single sparks an inch and more long taken off an aerial, and during a snowstorm I have seen a constant discharge of sparks about a quarter of an inch long flowing off an aerial to earth continuously for several minutes at a time. I have seen aerials fused for a portion of their length—this happened two or three times at the Rame Head station—but I have never known an operator to receive anything more than a slight shock. No doubt this immunity from danger is due to the care that is taken to see that the current in an atmospherically charged aerial is provided with a safe path to earth.

Interruption and Interception of Signals.

Interference caused by other stations, such as the intentional interference of an enemy, is of far less importance than is generally supposed. It is an extremely difficult thing to seriously "jam" a well-organised communication, and there are many ways, both technical and methodical, of defeating such an intention.

Jamming.

A good deal of misapprehension exists in the minds of the public concerning this question of "jamming." It is to a large extent a question of degree, and in the present state of development of wireless telegraphy it is a far more important problem from a commercial point of view than from a strategical.

The success of a commercial line of communication depends on the amount of traffic that can be handled in a given time. Interference

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The success of a commercial line of communication depends on the amount of traffic that can be handled in a given time. Interference

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and atmospherics may exist to such an extent that the service cannot be carried on on a remunerative basis. From a strategical point of view the case is different. It is desired to get a comparatively small number of messages through to some distant point with absolute certainty—messages which in most cases cannot be delivered by any other known means. It is the opinion of the writer that, given good apparatus and a highly-skilled *personnel*, it is absolutely impossible for an enemy to prevent a wireless message reaching its destination. It is not easy even to delay it for any considerable time.

Ineffectiveness of intentional interference.

As an instance of the ineffectiveness of intentional jamming, I find in a report of the wireless communications of the 1906 Naval Manœuvres the following interesting paragraph: "No serious interference was caused by intentional or unintentional jamming, though the enemy resorted to this for forty hours without ceasing." In connection with this question of the possibility of effective jamming by an enemy, it must not be overlooked that by attempting it the enemy is certainly putting his own wireless communication completely out of action for the time being, whilst it is very doubtful if he is seriously inconveniencing the communications of his more distant opponent. Severe atmospheric disturbances are far more difficult to deal with than interference, and there are undoubtedly times and places when it is absolutely impossible for an operator to receive a message for several hours at a stretch.

Code messages.

The danger involved through the interception of a fleet's signals by an enemy is also, in my opinion, often overrated. Co-operation between operators and full knowledge of each other's methods is extremely important when handling difficult code messages, and the more skilled the organisation, the more difficult it is for a strange operator to take down with the necessary accuracy the groups of a code message. He cannot ask for the repetition of doubtful groups, and he has no intimate and daily familiarity with the methods of his opponent to assist him in his task. And, after all, giving the enemy every advantage, giving him a perfect record of the signals, the key of the code to his hand and equal facility of skill and language to translate it for use—a most improbable combination, it must be admitted—he has still failed to prevent the all-important information reaching its destination.

The Imperial Wireless Chain.

It will be gathered from the foregoing remarks that wireless telegraphy possesses properties which are of the utmost importance from a strategical point of view. Money expended on its development can hardly be illspent. Cables may be cut and despatches

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miscarry, but so long as there remain efficient and well-protected wireless stations for strategical purposes communication is assured, whether it be with the fleets themselves, with the strategical bases of those fleets, or with British possessions overseas.

The Imperial chain of long distance wireless stations has been approved by Parliament, and work has already commenced on the erection of the first three stations—namely, those in England, Egypt, and India, but they should be only the outposts of a system which should eventually link up all British possessions and the fleets of the Empire.

Cost of long-range stations.

The comparative cost of long-range stations is small, probably fifteen or twenty such stations could be erected at the cost of a single modern battleship.

Nor is the outlay upon them likely to prove an unremunerative one. There is not the slightest doubt in my mind, judging from demonstrations which I have personally attended, that before many years elapse messages will be sent with perfect reliability by wireless telegraphy over distances of at least 2000 miles at speeds of at least 100 words per minute, whilst there are good reasons for thinking that these figures will be improved upon.

An almost inviolable line of communication erected on strategical grounds, which may at the same time prove itself to be equally justifiable on commercial grounds, should be a very attractive proposition to a "nation of shopkeepers."

In this article I have been concerned solely with the naval development of wireless as described in naval records, and in compiling it I have to thank Sir Henry Jackson for allowing me to look through his old notes, the Admiralty for permission to examine old records, and Captain C. G. Crawley, R.M.A., who has been closely connected with the development of wireless telegraphy in the Navy for the past eleven years, for much useful information and assistance.

F. G. LORING.

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CHAPTER VII.

British and Foreign Air-craft.

Progress of Naval Aeronautics.

The past year has seen steady progress in aeronautics made by all important countries. The most noteworthy advance is that made by Germany. Undeterred by the disasters to her naval airships, she has continued in this direction her building policy, and has now stepped into the front rank with her aeroplanes. Till a few months ago no great attention was given to the German heavier-than-air craft. It was said that her best pilots came from Alsace, and that the true German was slow and heavy-handed. So he may be, but he has evolved a type of aeroplane to suit his national characteristics. Aided by the Government and a patriotic fund, he has developed several types of first-class engines. With the exception of a few experimental machines the whole of Germany's aeronautical equipment is produced within her own borders. The only other country in which a similar state of affairs exists is France.

Great Britain still holds the lead in seaplanes, though, owing to her policy of testing all makes, she has a somewhat heterogeneous collection of various native and foreign types. No particular type has yet been evolved of such outstanding merits as to justify it being standardised. All nations agree that more powerful engines are required in seaplanes, and high-powered machines having, without exception, proved themselves the most satisfactory, it may be expected that machines with engines of 300 or 400 H.P. will be flying in the course of the next few months.

The functions of the various types of air-craft are now better understood, and there is general agreement amongst aeronautical experts that all types of air-craft must be developed.

Efforts are being made in all countries to reduce the vulnerability of non-rigid airships by sub-dividing them into compartments, and by fitting light fabric screens inside, with a view to these being sucked into a hole if made by projectile or otherwise, and closing it.

The aeroplane is in a more advanced stage of development than the airship, owing to the greater encouragement it has received in the shape of prizes offered by national funds, by newspapers, and by firms for advertising purposes. In fact, the possibilities of the airship are

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only just beginning to be realised outside Germany. France is now thoroughly awake to the situation, and has a most ambitious programme of airship construction in hand. There is a growing anxiety shown to get airships to sea. The development of the anti-balloon gun has led to a clear recognition of the fact that all tactical reconnaissance over land by day must be performed by aeroplanes, the airship being reserved for long strategical cruises over sea or land for night work, and for destructive raids on dockyards, oil stores, railway stations, etc.

The division of air-craft into types—battle-airships, mine-laying and scouting airships—as adopted in the last *Naval Annual*, is adhered to, as it is convenient, and the names give some idea of the functions of the two types, but the term "torpedo air-craft," used to denote heavier-than-air craft in last year's *Naval Annual*, has been dropped in favour of that of "seaplanes and aeroplanes."

In considering naval aeronautics it is not possible to ignore what is being done by the military authorities. The air is all one, and air-craft handled by military officers and men can be used for naval purposes, and *vice versâ*.

Great Britain.

All matters connected with aeronautics are in the hands of the Royal Flying Corps. This is divided into a Naval and a Military wing. The Naval wing is in the department of the Fourth Sea Lord, and is administered by the Director of the Air Department at the Admiralty. The Central Air Office is at Sheerness, under the Inspecting Captain of Air-craft. Under him are the Commanding Officer Naval Airship Section, the Commander of the Naval Flying School at Eastchurch, and the Commanding Officers of the Naval Air Stations round the coast. The Military wing is administered by the Director of Military Aeronautics at the War Office, who has under him the Commanding Officer Military Wing, and the Commanding Officer Central Flying School. The latter school is the joint property of the Navy and the Army, each finding half the funds, but is administered by the War Office. Organisation and *personnel.*

The Naval Airship Section is administered by a Commander, under whose orders are the captains of airships and the officers of the Airship School. On January 1st the Army airships were turned over to the Navy. This most important step was taken after due consideration of the requirements of the Army. These airships were found to be too small for the work required of them, and it would have been necessary to replace them with larger ships, such as are in use on the Continent. This would have entailed the expenditure of

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large sums of money on sheds and plant which could only be of use in the event of war in Northern Europe, and which could have been of no use to the Expeditionary Force if employed in Egypt, India, or South Africa. It is practically certain that the Admiralty will have to establish airship stations at our various foreign naval bases, and the air-craft stationed there will be able to work with any military forces operating in the neighbourhood. In favour of the transfer it may also be said that whilst the addition of airships to the Army holds out no prospects of permitting a reduction in any of the other Army votes, in the case of the Navy, should airships prove a success, a portion of the money spent on cruisers and torpedo-craft can be diverted to airships or possibly saved altogether. In any case, once the experimental stage is passed, there is no reason why the addition of airships to the Navy should lead to greater expenditure, whilst in the case of the Army it was bound to do so. The adoption of this policy, it is hoped, will expedite the development of airships in the British Empire. Incidentally, it marks the formation of what should be the most interesting service in the world. The Navy and the seaplane are tied to the sea, and the Army and the aeroplane are tied to the land, but the whole world lies before the airship. Where-ever there is trouble on sea or land, there will the airship be required to play its part. The officers and men will probably see more active service than any other force in the world. This being the case, the greatest care should be taken in the selection of the *personnel*. Not only will the officers require to be acquainted with Naval matters, but they must keep in close touch with the Army as well.

The Naval Airship Section has been fortunate in securing the services of nearly all the military officers who served with the Army airships, and they will be able to impart the necessary military knowledge to their naval colleagues, but arrangements will have to be made for the military education of future officers. A course at the Staff College and attachment to various units of the Army for a few months would seem to be indicated. It is only a close personal knowledge of minor details that will prevent an observer being deceived by dummy guns, by hay stacked on the top of artillery on the march, or by one of the many other simple devices for deceiving the inexperienced.

British battle airships.

With regard to vessels of this class, Mr. Winston Churchill announced in the House of Commons, on March 2nd, that a contract had been made with Messrs. Vickers for a large rigid airship, to be on the same lines and of the same description as the latest type of Zeppelin. This vessel is being built in England, and will, it is said, have about the same displacement as the German Zeppelins L 1 and L 2.

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Considerable progress has been made with vessels in the second category of air-craft. In the early part of the year a 7-ton ship was delivered by the Astra Company of Paris. She is fitted with two 200-H.P. Chenu engines and attained a speed of 51·1 miles per hour, a record for this type of craft. Her chief peculiarity is the shape and construction of her envelope. As is well known, the larger the diameter of a cylinder containing gas at a given pressure the greater the bursting stresses on the walls, so that any increase in diameter necessitates a stronger and consequently heavier fabric. To meet this difficulty the ship is made of a shape whose cross section much resembles the ace of clubs—that is to say, there are three cylinders of small diameter joined together, thus reducing the bursting stresses in the fabric and allowing light material to be used. The adoption of this shape increases the resistance of the envelope by about 5 per cent., but this is more than compensated for by the fact that most of the rigging is inside the envelope, instead of outside as is the usual practice, and a distinct gain is made on the whole. Some small difficulties of a mechanical nature were encountered in her first trials, but these have been since overcome. The envelope is now being somewhat enlarged to give increased endurance. A larger ship of the same type, having a displacement of 12 tons has been ordered. British mine-laying and scouting airships.

A Parseval airship of 8·5 tons did her trials in Germany in the spring of last year and was delivered in England in the summer. She has two 180-H.P. engines and a speed of 42 miles an hour. A cardinal feature of this type is increased strength. All parts are of chrome-nickel steel except the petrol tanks and valves. The car is suspended from a girdle on the underside of the envelope, and bands pass from this girdle right over the envelope, greatly assisting to preserve the shape. The size of this ship has now been increased to 10 tons, and three more ships of similar displacement are on order and will be delivered this year.

Three ships of 15 tons each have been ordered from Messrs. Armstrong, Whitworth & Co., and delivery is expected before next spring. These ships are of the Forlanini type, an Italian design, which will be described later.

The Army airships turned over to the Navy are too small for war purposes, but will be useful for training and experimental work. They consist of the Eta of 3·5 tons, the Delta of 5·3 tons, the Gamma of 3·4 tons, and the Beta of 1·2 tons, and in addition there is the airship built by Mr. Willows, No. 2, which has been fitted with a new envelope and brought up to date. She will also be employed for training. As far as numbers are concerned satisfactory

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progress has been made, but an increase in size in future ships would seem desirable should the larger ships of this class building for France prove a success.

Sheds.

There are no sheds in the country yet finished capable of holding a 12-ton ship; the three sheds taken over from the Army are only suitable for small ships. British manufacturers have as yet shown no eagerness to secure contracts for constructing sheds, probably because they have plenty of ordinary standard work in hand and do not care about launching out in a new line. There is, however, one shed being erected by a British firm at Kingsnorth, near Chatham, and it may be ready this summer, after being under construction for some two years. At the same place another wooden shed, constructed in Germany, is being erected by Messrs. Vickers, who are also putting up a similar shed at Walney Island, off Barrow, in which they will construct their rigid airship. These sheds are to be capable of holding four 10-ton ships each or two rigids. The old shed at Barrow, in which the first naval airship was built, has been converted into a factory and workshop. It is in contemplation to erect another shed for a station in Norfolk.

Seaplanes and aeroplanes.

There are now four seaplane stations in England—at Calshot, near Portsmouth, Grain Island, Felixstowe and Yarmouth respectively. Two more are in course of erection in Scotland—one at Dundee and the other at Fort George, near Cromarty. During the course of the year probably four more stations will be established, so as to continue the line to the North of Scotland, and to fill in the gaps along the east coast. Dover and Plymouth may also be equipped with seaplanes.

The are 109 seaplanes and aeroplanes now in the possession of the Admiralty, and seventy more have been ordered. The types include Avro, Short, Sopwith, White-Bristol, and Vickers; Coventry-Ordnance; Hamble-River, Luke and Co; and the Royal Air-craft Factory, amongst British makers, and Blériot, Borel, Henri Farman. Maurice Farman, Deperdussin and Caudron of foreign firms. Unfortunately there are only three engines of British manufacture in use, but it may be hoped that the engine competition, held in conjunction with the War Office, will assist to remedy this source of weakness.

A total distance of 131,081 miles was flown by the aeroplanes and seaplanes of the Naval wing, with one fatal accident to an officer whilst flying a Service aeroplane, two whilst flying privately owned machines, and one caused by an accident on the ground. There has been one casualty amongst the men, the accident occurring on the ground.

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Work has been regularly performed by the seaplane in conjunction with the patrol flotillas. At those air stations where coastguard stations formerly existed, all the functions of that branch of the Service are now performed by the crews, thus combining economy with efficiency.

In addition to the air stations above mentioned, there is a Naval Flying School at Eastchurch, under a Commander, where men go through their preliminary training, and officers go through a final course in high powered-machines and seaplanes (in conjunction with Grain Island) before being drafted to the air stations.

The Central Flying School.

This establishment is now equipped with some fifty machines, and is used for the higher training of naval and military pilots. It is at present commanded by a naval officer, with a military officer as second in command. It serves a most useful purpose in enabling officers of both wings of the Service to become acquainted with each other's requirements.

It will be seen from the above account that, with the exception of battle-airships and airship sheds, the progress of Great Britain during last year was distinctly satisfactory, and if a good British engine can be obtained, it should be possible before long to make the aeronautical industry of the country entirely independent of foreign sources of supply. It is to be sincerely hoped that this result will be achieved.

Germany.

Battle airships.

Germany has been most unfortunate in her air service during the past year. In previous years ships have been lost, but none of their passengers or crew have been killed. With the loss of her two naval airships the *personnel* of this section of her air service was reduced to one officer. It speaks volumes for this type that the German authorities, who know most about it, and have a larger experience than any other, should proceed with the building of ships of increasing size. Little is known here about the work done by the German naval and military ships, as the national press is not allowed to print anything on the subject. Some information, however, is given of the performances of private ships such as the Victoria Luise, and the following *résumé* of her performances shows of what a well-found airship is capable when working from reasonable sheds.

The Victoria Luise made her preliminary trial on February 16, 1912, and was taken possession of by the Delag Airship Co. on March 4, 1912. She made her 100th trip on June 23rd of that year, and her 200th on October 21st, that is to say, 200 trips in 252 days. Her 300th trip was completed last June, and her 400th on November 26, 1913, when she was laid up for the winter

She carried 8551 persons and covered a total distance of 29,430 miles in 832 hours 22 minutes. This works out at an average of 21 persons for each trip.

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The average trip was slightly over 72½ miles, and the average speed 34·64 miles an hour. She used 218 lb. of petrol per hour and 23 lb. of lubricating oil, also 428,000 cubic metres of gas, which is the only item that seems excessive. The average number of passengers and the average length of the trips are noteworthy points. The average speed is not very great, but this is explained by the fact that the passenger ships frequently run up to Berlin and spend an hour or two cruising slowly over the town.

It is comforting to think that the lessons which have been learnt from the loss of the two German ships will make aerial navigation with this type of air-craft safer in future; nothing is sadder than the loss of valuable lives with no gain to the world's knowledge. The preliminary trials of L 1 were made at Johannisthal, and on the completion of L 2 she moved to Hamburg. On September 9th arrangements were made for her to work with the High Seas Fleet in the neighbourhood of Heligoland. Before sailing she received warning from the Meteorological service (which is very highly organised in Germany) that the weather was in a disturbed state, and that it might be better not to leave. It appears, however, that even in Germany there are some people who can see no use for airships, and are ready to condemn them for any failure, even in their present undeveloped state, and the commander of the ship had such confidence in her that he thought it better for the Service to risk the weather than to give occasion for cavil by his non-appearance. All might have gone well had an ordinary blow been encountered, but one of extrordinary violence was met with—probably a "line squall," a form of squall particularly to be dreaded because of vertical motion of air that accompanies these phenomena. In any case, the captain of the ship who picked up the survivors is reported to have said it was the worst blow he had met with in 30 years. The ship was carried to a height of about 5000 ft. by a vertical up draught, thus causing the gas to blow off and the ship to lose buoyancy. Rain fell in torrents, and the outer cover, being capable of absorbing moisture, must have become heavy to the extent of about 2 tons. The air was in such a disturbed state that the rudders were useless. Ballast was let go, and as much petrol as could be got rid of in the time, and wireless signals were sent to the Fleet saying that the ship must be thrown on the water, and asking for assistance. She was finally caught in a down draught and thrown on to the sea, where she broke up and sank with the loss of fourteen lives. This most regrettable mishap emphasises the importance of having an outer cover on the ship that will not absorb water, of being able readily to drain the petrol, and—probably more important than all—the great value of swivelling propellers, as in such circumstances they would not be put out of action by disturbed air as rudders and elevators are.

After this disaster, L 2 was prepared as rapidly as possible. She

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was of 27 tons displacement, some 5 tons larger than L 1, and was modified in several ways. A special gondola was supplied for navigating purposes forward, well away from the noise and disturbance of the engine-room. The keel, instead of being outside the ship, was placed inside, so as to reduce the resistance. For the same reason the two gondolas containing the engines were placed as close to the hull as possible. In previous ships a small wind screen had been placed forward to protect the crew, but air could pass over the top of it. In this ship the wind screen was carried right up from the gondola to the hull, and there is no doubt that this was the primary cause of the accident. The ship started from Johannisthal with twenty-eight persons on board. She was quite full of gas. As she rose the gas expanded and blew off through the gas valves, which, according to the usual Zeppelin custom, are on the under side of the gas-bags. Owing to the ship's progress through the air a partial vacuum was caused behind the wind-screen, thus sucking the escaping gas into the car. Then something caused a spark and ignited the hydrogen. A spark at the contact-breaker of the magneto or a back-fire into the carburetter would account for it. The crew had time to use one extincteur, but the fire spread rapidly along the ship, and she was destroyed with all hands. From this catastrophe is to be learnt the importance of enclosing the engines, wireless gear, etc., so that no gas can possibly reach them, so that any fire occurring in a carburetter or a spark at a contact-breaker is confined to its own casing. The gas valves, too, should be placed on the top of the gas-bags, though they are less easy of inspection there, or else some arrangement made for leading the gas away clear of danger. In these two disasters Germany lost the chief of her Air Department at the Admiralty, and all except one airship officer.

Efforts were immediately made to minimise the effect of the mishaps. The Zeppelin Sachsen was hired from the Delag Company, and the training of crews was continued. Two new Zeppelins of 32 tons were ordered and a Schütte-Lanz of the same size. The Army now have eight Zeppelins in their possession and two Schütte-Lanzs. The latter type have proved rather heavy on their trials, but doubtless with more experience this fault will be overcome. In the spring of last year Z 4, then doing her trials, had the misfortune to get out of her course; she lost her way, and landed at Lunéville, where she was detained for 24 hours, so that the secrets of Zeppelin construction became known in France. Comparing ships of the present moderate displacements, the rigid types such as the Zeppelin and Schütte-Lanz are not so suitable for height flying as

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the non-rigid types. This advantage is counter-balanced by the fact that the rigid can remain in action after receiving damage when the non-rigid cannot. For sea work great height is not generally necessary, but over land, during daylight, it is of great importance. For a ship of 10 tons it is necessary to discard approximately 1 lb. of ballast for every foot ascended, for a 20-ton ship 2 lb., and so on. The rigid ship is thus hampered by the weight of her metal or wooden hull, so that she cannot go so high or carry such heavy weights as non-rigid ships of the same displacement. It is reported that the German military authorities were not altogether satisfied by the height maintained by the rigid ships in the last manœuvres. To get over the difficulty they are financing an experiment in the building of battle-airships designed by the Parseval Company. In this vessel there will be the ordinary envelope of the non-rigid type, but divided into compartments. The outside will be stiffened by a light framework, just sufficiently strong to keep the ship in shape should she loose her internal pressure. It is hoped in this way to obtain the advantages of both types. The new ship is expected to rise to 10,000 ft., and to be able to stay for two days in the air. Her maximum speed will be 49 miles an hour. She should be an interesting experiment, and the circumstance that the Government are willing to put money into an untried, but promising, type must be of great encouragement to the native airship building industry. It shows the determination of Germany to keep their lead in battle-airships, if this can be done by encouraging native invention and enterprise.

Mine-laying and scouting airships.

Comparatively little attention has been paid to this class; in fact, it was only because they were considered of little use that the Parseval airships were allowed to be sold to foreign countries. The eagerness with which they were bought by Great Britain, Russia, Italy, Austria, and Japan again drew the attention of the authorities to them, and a ship of 11 tons has been delivered to the Army and one of about the same size has been ordered for the Navy. A new ship of the Gross type, with a displacement of 13 tons, is also building.

Sheds.

It has been decided that all sheds built for the Government in the future are to be of the revolving type—that is, those which are for housing the active service ships. These sheds cost £70,000 each to build, and it is probable that fixed sheds will still be used for building and repair purposes on the score of expense. In pursuance of this policy, two double-revolving sheds for the naval ships are approaching completion at Cuxhaven, and two more are projected. The large cities have continued building sheds, and in the course of some six months the authorities at Leipzig erected a shed capable

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of holding three Zeppelins. As a type of fixed shed it is probably superior to any other. The sides are of brick and the roof of reinforced concrete, so that it is not subject to such variations of temperature as sheds covered with corrugated iron, of which material the English sheds are mostly constructed. There are now eight sheds in Germany capable of holding the new 32-ton naval ships, and thirteen others capable of holding 22-ton ships, with a total of thirty-two sheds built and four building in various parts of the country.

Seaplanes and aero-planes.

There are now seaplane stations at Putzig, Kiel, Wilhelmshaven, and Heligoland, and a station is being established at Kiao Chau. An aeroplane station will also be erected in German South-West Africa. The seaplanes in use are of the Albatros, Euler, Avro, and other types. There are some 500 good aeroplanes in Germany, which country now holds the record for endurance with a flight of 16 hours 20 minutes, whilst another machine accomplished 14 hours and 16 hours 1 minute in the course of one week. The engine used in these aeroplanes was a 90 H.P. Mercedes, and both machines, though of different make, were of the well-known automatically stable Taube or dove type.

FRANCE.

Battle airships.

One ship of 38 tons has been ordered from the Astra Company. She is of steel, and a speed of 70 miles per hour is hoped for. One experimental rigid ship is now in existence, the Speiss, built by the Zodiac Company. Originally she was too small, and could only be made to fly by removing her after engine. She has since been enlarged to about 20 tons, and is a success. She is of wooden construction, and, now the preliminary experiments have been carried out, will doubtless be followed by more ships of the same class. Some of the non-rigids building in France almost deserve inclusion in the category of battle airships; they are so well subdivided that one hole would not necessarily bring them down; but no non-rigid has yet been devised which can navigate after receiving serious damage, and this should be the crucial test for the inclusion of any airship in the fighting class.

Mine-laying and scouting airships.

None of the ships of the programme of 1913 had been delivered at the end of the year, but the trials of most of them were to take place in the spring of 1914. There are two ships building by the Astra Company, with a displacement of 23 tons and engines of 1000 H.P. A speed of 60 m.p.h. is anticipated. They are of similar type to the Astra delivered to Great Britain, but will be divided into about twelve compartments. Two ships of 22 tons are building by

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the Clément-Bayard firm, also of 1000 H.P. One Lebaudy and one Zodiac of 17 tons and one Lebaudy and two Zodiacs of 10 tons are also under construction. The trials of the big ships should be of the greatest interest and importance, as should they come up to expectations, they will be very useful long-range scouting ships for use with the Fleet.

Sheds. There are twenty-two sheds, military and private, and it is reported that eight will be built for the Navy at Fréjus, Cherbourg, and Dunkirk. The French sheds are not nearly so good as the German, and those on the east littoral are said to be too close to the frontier, and liable to attack before the formal outbreak of war. Now that so many ships of about 20 tons displacement are building or on order, the provision of larger and better-situated sheds becomes pressing.

Seaplanes and aeroplanes. Slow progress has been made with this type. Nearly all the principal aeroplane manufacturers have fitted floats to their ordinary land machines. The various meetings at Monaco and elsewhere have all gone to prove the necessity for bigger machines, with higher horse-power, thus giving better seaworthy qualities and more clearance of the propeller from the water. The Henri and Maurice Farmans, Breguet, Borel, and Nieuport appear to be the most successful types. Stations are believed to exist at Nice, Dunkirk, Toulon, Rochefort, Bizerta, and Bonifacio, and others are being established at Cherbourg, Dunkirk, and Fréjus.

Some remarkable flights have been made by French airmen, of which, perhaps, the most interesting is that of Garros in crossing the Mediterranean. It is not possible to refrain from a feeling of admiration and satisfaction at the accomplishment of such a feat, even if inclined to condemn the promoters of such an enterprise for staking a life against the reliability of an engine, when the same reliability could be proved over land or water within reach of assistance should failure occur. Had the journey been accomplished in war, or with some useful purpose in view, nothing but praise would have been heard. As it is, the additional prestige accruing to French airmen and airmanship may well be worth the risk incurred. Other notable flights are those made from Paris and Cairo by two different pilots, but these do not compare with the crossing of the Mediterranean, as the airmen had ample time at their disposal, and could alight, if necessary, at many points on their route. On the whole, French strength in aeroplanes may be said to have declined in comparison with other Powers. Certain scandals in connection with the sale of machines to the Army have had a disturbing effect, and the aeroplane service has been reorganised, and entirely separated from

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that of the airships. France is credited with about 1000 aeroplanes, but not more than half of these can be reckoned on for war service.

ITALY.

It is stated in the Press that three battle airships of 32 tons are projected, but the report lacks confirmation. Battle airships.

Since last year the two ships of the M type have been completed and another one, M 3, built. The latter is principally intended for Naval use. They have three engines of 180 H.P. each (Maybach), the cars for two of the ships having been constructed by the Parseval Co. in Germany. Their speed is 43 miles an hour. A new type of ship, the Forlanini, has been evolved, and one of these vessels has been constructed for the Government, the money being raised by private subscription. Another has been ordered for the Italians, and Messrs. Armstrong having acquired the rights in this country, three have been ordered from this firm for the British Government. These ships are of 15 tons and divided into nine compartments. A long girder keel runs under the ship and close to the envelope, containing the engines and crew and so abolishing all rigging. The result is a noteworthy reduction in head resistance. The Forlanini, using engines of a total of 320 H.P., has slightly more speed than the M type, with engines 540 H.P. Elaborate precautions are taken against fire. When these ships are modified by having swivelling propellers fitted forward in place of the fixed ones aft, and when some further reduction in head resistance is made by altering the form of rudders and elevators, they should be a very useful type of air-craft. Mine-laying and scouting airships.

In addition to the above the Italians have one Parseval of 10 tons, and five ships of the P class of from 4·2 to 4·7 tons. More particulars are now available of the work of two ships of this class, P 3 and P 4, performed during the Tripoli campaign. The first shed erected for them was blown down, but a German shed was purchased and erected in thirty days. Altogether ninety-one flights were made during hostilities, the enemy being engaged on forty-six occasions; 330 bombs were dropped, one of which, it is stated, killed and wounded thirty-eight men. After the conclusion of hostilities 127 more flights were made before the ships returned to Italy. During the course of the war a shed was also erected on the island of Leros. Great use was made of photography, the whole scene of operation in Tripoli being beautifully mapped from the airships. These operations point to the usefulness of airships in the British Colonies. In Somaliland, Persia, British East Africa, and elsewhere, British prestige is lower than it has been for many years past. These

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countries are not at present worth the money required for building railways. The chief difficulty of military operations is transport, making the catching and punishing of marauding bands of great difficulty. A few well found airships should be able to deal with the situation. In any case the experiment is worth trying, as the cost would not be great and the experience gained should be invaluable.

Sheds. There are ten sheds, the two largest of which are 360 ft. long and 90 ft. wide. These are at Campalto and Ferrara. Another shed of unknown dimensions is building at Jesi.

Seaplanes and aeroplanes. Development of seaplanes has been slow, and it is believed that only about twenty are in the possession of the Admiralty. It is proposed eventually to establish fifteen stations round the coast. Twenty-six field squadrons of four monoplanes each are being formed and four squadrons of seven biplanes. It is hoped to send two squadrons to Tripoli, one to Somaliland and one to Erythrea. There are now about 200 Naval and Military aeroplane pilots in the country.

Austria-Hungary.

Battle airships. It is reported that the German Government have given permission to the Zeppelin Company to sell six ships to Austria. These cannot, however, be delivered before 1915. It is doubtful if Austria can find the money to pay for these ships and their necessary sheds.

Mine-laying and scouting airships. The fleet has not been increased since 1913 and consists of three small military ships. There are also one small private ship and a private ship of 812 tons, built in 1910, and now probably of little use.

Sheds. There are three small sheds, two at Faschamend and one at Budapest.

Seaplanes and aeroplanes. There is a seaplane station at Pola, believed to be equipped with Donnet-Leveque and Curtiss types of seaplanes. There are two types of aeroplanes constructed in the country, the Etrich-Taube and the Lohner-Daimler, both very good machines.

Russia.

Battle airships. There are none in existence yet, but the purchase of a Parseval type is contemplated. Two small ones are reported to be building, including one of 13 tons by the Baltic Works, Riga.

Scouting and mine-laying airships. Russia has thirteen of this class built and three building. Only seven of them are of sufficient size to be of much use in war. In view, however, of the number of sheds building and projected, it is very possible that more ships are in existence or building. The whole of Russia is a forbidden area to other air-craft, and little information

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leaks out as to progress made in Naval and Military aeronautics. It is reported that a condition of the French loans to Russia is that she shall buy her air-craft in France, and two 23-ton ships have been ordered.

Sheds.

It is believed that there are eight sheds in European Russia, all of good size, and most of them double sheds. It is also reported that two are in course of erection at Vladivostock, and that two more are projected. If this is true, it looks as though Russia did intend to be left behind in the race for the command of the air. She is probably the third strongest air Power, with Italy fourth and Great Britain fifth. Should Russia build airship stations in Northern Persia it will give her a great hold on that part of the world, and doubtless they will be of great value to her in Mongolia, where there are no railways and the movement of troops is slow. Next to Great Britain no country stands to gain so much by the use of airships as Russia.

Seaplanes and aero-planes.

There are seaplane stations at St. Petersburg, Reval, Sevastopol and Cronstadt. The Curtiss type appears to be the favourite. There are probably twenty-four machines of that type in the country, besides a number of machines of French make. The greatest step forward in the design of heavier-than-air craft during the last year has been made by Sikorsky, a Russian designer. He has produced a machine driven by four independent 100 H.P. motors and which has carried as many as sixteen passengers. Five have been ordered for the Russian Admiralty to be fitted as seaplanes, whilst a number have been ordered for the Army. The other machines in use by the Army are principally Nieuports and Farmans.

Minor Air Powers.

Japan has one Parseval airship of 8·5 tons, and Turkey one of 2·2 tons. Spain has one Torres airship of 1·6 tons. The United States have seaplane stations in Florida and Manilla.

Future Progress.

All types of air-craft are still increasing in size, and are likely to continue to do so to meet the demands for greater speed, greater weight-lifting powers, and better sea-keeping qualities. The interesting period will be when airships grow to such a size that none of the existing sheds will hold them. This is bound to occur before very long, and whichever nation first specialises on really large ships, will be in a fair way to gain that position in the air now held by Germany, as all the latter's present building and housing facilities would be of little use. There are no signs of

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Great Britain going in for large ships yet, and if Germany herself does not lead the way, it may well be that Russia will do so, as she has in the matter of large aeroplanes. There seems no reason to doubt that airships of at least the linear dimensions of the largest water ships, can and will be built—that is, ships of some 800 ft. long and 90 ft. in diameter, or more.

If air-craft can be fitted with water propellers, and designed so as to be able to alight on the water and use them when it is blowing hard, a great step forward will have been made. If we imagine a 50-miles-an-hour air-craft proceeding against a 50-miles-an-hour wind, she will make no progress using all her horse-power. If, however, she alights on the water and uses a water propeller, a very small proportion of her horse-power will enable her to proceed over the water and against the wind. This has a most interesting corollary. If a ship has a water propeller in the water and allows the wind to blow air propellers round (like a windmill), the power she can get from her air propellers if applied to the water propeller will enable the ship to proceed against the wind at half the wind's speed. That is to say, that a seaplane or airship on the water, with a 50-miles-an-hour wind turning round her air propeller, should be able to get over the water and against the wind at a speed of 25 miles an hour, provided there was no loss of efficiency in the transmission. Of course, there always is loss, but if gears were designed with such low efficiency that the air-craft just moved against the wind at a few miles an hour, it would be a great gain, as it would mean that a broken-down ship or seaplane could always get home whether she had petrol or not. In fact, in the case of an airship, it means that she could go where she pleased, using only wind power and ballast. When this problem is first presented to people they are inclined to say that it is the problem of perpetual motion, and therefore impossible. They may be reminded, however, that the sailing ship does proceed against the wind, using wind power alone, and that therefore it is obviously not impossible for air-craft to do the same, if only suitable apparatus is devised.

Then again there is the question of the hydrogen engine for airships to be considered. Hydrogen has a much higher thermal efficiency than petrol, and the time may come when a ship will carry liquid hydrogen as fuel and ballast and for replenishing her gas-bags. The advantages of being able to do so are not only that it will enable her to release deadweight in the form of ballast, as can be done now, but to use it for increasing the lift of the ship at the same time. That there is ample scope for future development

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all must agree. In conclusion, acknowledgment must be made to *The Times* and to the *Taschenbuch der Luftflotten* for some of the information contained in this article.

Tabular lists of the airships of the Powers are given on pp. 282–284. Only ships which are likely to be of use on active service have been included. Tabular lists of the sheds have been added this year.

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CHAPTER VIII.

The Balkan War.

Operations of the Greek and Turkish Fleets.

No accurate and detailed description of the naval operations which took place during the struggle between the Ottoman Empire and the four Balkan Powers can be obtained for the present. Nor during the subsequent hostilities between Bulgaria and her allies were there any fleet movements of importance. At the same time, it is desirable to place on record the incidents of the war, so far as they took place afloat, because, although it is doubtful if they throw any useful light upon tactical problems, the whole course of events was a further demonstration of the value of sea power. Once more the old, old lesson of preparing in peace for war was enforced. The Turks, although they were actually engaged in hostilities with Italy when the new danger threatened, were quite unready to meet it. When the Greeks took action, the Ottoman forces could not protect effectively their interests in the Ægean, nor secure for their troops the shortest passage from Asia Minor. On the other hand, the Greeks showed initiative and enterprise by striking hard and without any delay, as the subsequent narrative will show. The battles of the campaign were not of great importance from a naval or professional standpoint, being in the nature of mere skirmishes, in which the simplest formations were chosen, few signals were exchanged, and little or no attempt was made for the control of fire. Nor did the torpedo craft, considering the numbers and character of the boats on either side, accomplish as much as might reasonably have been expected.

Early naval movements.

It will be unnecessary for the purpose of these notes to do more than briefly glance at the circumstances which led up to the war between Turkey and the Confederated Balkan States. The revolt in Albania, complications with Montenegro and Bulgaria, collisions with the Greek outposts, and the continuation of the war with Italy, had resulted in a highly critical position. There were reports that the Balkan League, ostensibly established to support the interests of their nationals in the Ottoman Empire, hoped to take advantage of the troublous times, and had for its real purpose the expulsion of the Turk from Europe. Owing to the concentration in Asia Minor, near the Dardanelles, and in the Western Provinces, a large proportion of

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the Turkish Army had been withdrawn from the northern frontiers, while there were rumours of secret preparations for war in Bulgaria and Servia. At the beginning of September, 1912, a state of high tension prevailed.

The fact that Bulgaria, Servia, Montenegro, and Greece were acting in accord was clearly demonstrated by the simultaneous issue, on September 30th, of orders for the mobilising of the armies of these four States and of the Greek Navy. The Ottoman Government replied by a military mobilisation on October 1st, and at the same time detained a number of Greek merchant ships in Turkish ports on the pretext that they were needed for the transport of troops. The Great Powers made representations to Turkey and to the Balkan States in the interest of peace, but all their attempts at mediation were useless, for on October 8th Montenegro declared war. On October 17th Bulgaria, Servia, and Greece followed suit, and Turkey replied by a similar declaration. Oddly enough, considering that a state of war with Italy still existed, a decree for the mobilisation of the Turkish Navy was issued on October 12th. Six days later peace was made with Italy on the basis of the official Turkish recognition of Italian sovereignty over Libya.

Events on land.

On the outbreak of war, events of decisive importance occurred with unexpected rapidity, indicating a surprising state of preparation and efficiency on the part of the allies, and the usual unreadiness of their antagonist for the struggle. So far as the principal objectives of the four armies were concerned, the following table shows how the Turks were caught unawares:—

Oct. 8. Montenegro declared war.
Oct. 17. Servia, Bulgaria, and Greece declared war.
Oct. 18. Investment of Scutari by Montenegrins.
Oct. 23. Adrianople invested by Bulgarians.
Oct. 26. Uskub occupied by Servians.
Nov. 8. Salonika surrendered to Greeks.
Nov. 12. Turkey requested an armistice.
Dec. 3. Armistice arranged between Turkey and the three northern allies.

The operations on land are beyond the scope of this article, except where carried out with naval assistance, but the above table shows how speedily matters moved when once the war began. The following chronicle of the chief naval events of the war, and particularly those which appear to have influenced its results, has been compiled from various sources, the newspapers, both British and foreign, having been mainly laid under contribution. In some measure it has been possible to check these narratives by the official despatches, and by

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letters from correspondents in touch with the movements on the one side or the other.

The peace with Italy.

The surprises of the war were not confined to the land operations. With the conclusion of peace with Italy, the naval situation became entirely changed. The Turkish Navy was no longer condemned to inactivity in the Sea of Marmora, but could at least attempt an assertion of its strength and make its influence felt. There was every reason for a bold stroke. It was essential to Turkey that she should have a free and unmolested passage to Europe from the ports in Asia Minor, where, in the neighbourhood of Smyrna, she had concentrated a very large force in view of a possible Italian descent. By obtaining control of the waters in the Ægean Sea, she could shorten the distance of the passage for the transit of her troops, and, by placing them in Macedonia, be able, in the quickest time, to bring them to the theatre of war. Greece alone of the Confederate States possessed a fleet—an untried one—and certainly without the superiority which that of Italy possessed and had exercised with so much ability. There was no marked disparity between the two forces, which, at least, so far as their nominal strength was concerned, balanced one another pretty equally, the advantage, if anything, being on the side of the Turks. Nor could Greece omit to accept a challenge for the mastery of the sea. It was important for her not only to ensure the protection of her own coasts, but to be free to operate among the islands or on the Macedonian littoral. Obviously, everything pointed to a struggle between Greece and Turkey for supremacy in the Ægean Sea, and the primary objective of the Turkish Fleet should have been the naval force of the enemy. It will be seen that, either owing to timid councils, to the absence of any plan, or for some other reason, the Turkish Navy was not used in this way, and, to the surprise of many, Greece, with one effective vessel, the Giorgios Averoff, which she owed to the patriotism of a public-spirited citizen, was able to assert and maintain supremacy in the waters of the Ægean Sea.

The strategical questions.

It was a singular feature of the situation that each of the two opposed Powers which possessed naval strength found itself at the outset virtually master of one of the three water areas which bound the theatre of land operations. To the southward, in the Ægean, the question of supremacy afloat might be in dispute, but unless it was quickly settled against her, Greece, from her ports at Patras and Corfu, could exert a local command in the Adriatic to the westward, either through the Gulf of Arta, or off the ports of San Giovanni di Medua and Durazzo. Similarly, unless Greece could

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force the Dardanelles with her fleet and obtain a decisive victory, the Turks possessed the same kind of advantage to the eastward in the Sea of Marmora and the Black Sea. The passage from Smyrna and other ports in Asia Minor by sea to Macedonia could only be opened by battle, but the troops concentrated in that quarter could be conveyed by rail to Haidar Pasha, the terminus of the Ismid railway, which has branches to Angora and to Kara Hissar, where it joins the main line between Smyrna and Eregli. The teaching of all sea experience should have convinced the Turks that their primary objective was the naval force of the enemy, and thus have urged them to make their utmost efforts to destroy or disable the Greek Navy, as a preliminary measure to further operations. Even had they been unsuccessful, the defeated remnants of their Fleet might still have held the Dardanelles, protected by its forts and mine obstructions, so that they would have been in no worse case by the attempt. But history also teaches that nations do not always take the most obvious or wisest step in naval matters. Nor is it to be denied that the *rôle* which the Turkish Fleet could play in the Black Sea on the Bulgarian coast, secure from hindrance or molestation, appeared to offer what may well have been considered compensating advantages. Bulgaria was the most formidable of the foes of Turkey, from a military point of view. Bulgaria beaten on land, and it was probable that her confederates would in the end reap little benefit from partial successes. Therefore, to operate on the Bulgarian coast, to threaten a descent in force, might, indeed, have been a good game to play. Undoubtedly there were points in favour of such a course of action. Through Haidar Pasha, in the Sea of Marmora, from the garrisons in Asia Minor, the troops for such a purpose could be drawn. There was no lack of transport, since Turkey has a Mercantile Marine which includes, according to Lloyd's Register, 141 steamers, aggregating 120,412 tons; or, as the distance is short, the Greek merchant ships, upon which an embargo had been placed, might also have been utilised for the purpose. The Bulgarian coast offers many points at which a descent might have been made, only the ports of Varna and Burgas having some protection from forts and a weak flotilla of torpedo craft. The Italians had given ample demonstration of how such expeditions should be carried out, and how transports could be used in connection with naval force. To have placed a force on shore, or even to have made a feint of such an operation, would have been likely to deflect a large portion of the Bulgarian Army and to have relieved the pressure on the frontier of Thrace. It was, however, essential to the success of such an enterprise that it should be put in

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execution promptly, and in all probability Turkey never had the men to spare, let alone the energy and decision to formulate a plan for carrying it out. Thus, whatever may have been contemplated as a demonstration of the invaluable character of superior sea command, even when merely local and temporary, the potential threat of such an operation had no real influence upon the course of the war.

Greece, on the other hand, had the work of her Fleet as clearly defined. It was her first object to contain the Turkish ships in the Sea of Marmora, or to destroy them if they offered battle. By such a course she would prevent the sea transport of troops from the ports of Asia Minor to those in Europe, and thus materially help her allies on land. Once having asserted her supremacy as the sea Power in the Ægean, she would not only protect her own shores from molestation, but could occupy the Turkish islands at her leisure, could assist in the movements of her troops against the Turkish towns of Yanina and Salonika, and could carry out raids on the southern coast of Macedonia, where the railway from Constantinople *viâ* Dede Agatch to Uskub runs for some distance not far from the sea. By destroying this line she could delay or prevent the despatch of reinforcements to the eastern provinces in Albania. The advantages of asserting her naval superiority were thus quite obvious, and no real attempt was made by the Turks to frustrate them.

This, then, was the position of affairs at the beginning of the war. The Turkish Fleet was eastward of the Dardanelles, the bulk being in the neighbourhood of Constantinople. The Greek Fleet was at the Piræus, with some small vessels to the eastward of Salonika and some torpedo craft in the neighbourhood of the Ionian islands or in the Gulf of Patras. The constitution and fighting strength of the naval forces on both sides may now be briefly described.

The rival Fleets.

Of the five Powers engaged in the war, neither Servia nor Montenegro had any strength at sea, and that of Bulgaria consisted of a small gunboat, the Nadiezda, of 715 tons, built at Bordeaux in 1898, with six Creusot torpedo-boats, of 100 tons displacement and 26 knots, built in 1907–10, and three earlier boats, of 97 tons and 20 knots. All these boats carried three 3-pdr. and three torpedo tubes, but the training and experience of their crews must have been small. Neither were the fleets of Turkey and Greece of a formidable description.

The Turkish Navy is not without its glorious past, and has traditions of victory, but although in every war in which the Ottoman Empire has been engaged maritime strength has been exerted with important results, the lessons have never taught the Turks

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anything of lasting value. Nor has the Turk ever shown any real aptitude for naval work, or signs of that essential energy or readiness of resource which are required for any great achievement by sea. British professional help and counsel were sought and freely given when the need for thorough reorganisation had been recognised, but it is of little avail to have the best advisers if their advice is not taken and acted upon. A navy which has been neglected for a quarter of a century cannot be made effective without the continuous and consistent exercise of organising power and administrative ability for something more than two or three years. Rear-Admiral A. H. Limpus, C.B., succeeded Rear-Admiral H. P. Williams as Naval Adviser to the Turkish Government in April, 1912, and with the assistance of a staff of officers had continued the work begun by Sir Douglas Gamble in 1908. On the outbreak of the Balkan War, these officers continued their advisory duties, as they had during the hostilities with Italy, but they were confined to administrative work on shore, and at no time took any active part in the actual operations. Some improvements in discipline and in the handling of the ships were apparent, but the training difficulties alone with such varied material—English, German, French, American and Italian—would handicap any short-service navy. It is doubtful, indeed, if the Turks possess the right qualities for naval purposes. Some of the officers, it has been said, have shown considerable promise, but in the bulk they exhibit neither capacity nor enterprise. It is of little use under such conditions that the seamen should be, as they are by all accounts, willing, obedient, and in many respects excellent fighting material. Whether these men are Turks, or, in fact, the descendants of seafaring peoples overcome by the Turks, is not a question which need be discussed. It is certain, however, that where the rulers of Turkey have appreciated the value of a fleet, they hired the services of other races to train their seamen and fight their ships. It is long since this plan was followed with success, and it scarcely needed the test of a conflict with a superior Power like Italy to demonstrate the result of years of neglect and mismanagement.

The Turkish effective ships.

As a result of the war with Italy, there had been a weeding out of ancient and ineffective vessels, and, in addition, a proportion of those which had been of service were either captured or destroyed in battle. A fair estimate of what remained includes only four or five battleships, two protected cruisers, eight destroyers, and six or seven torpedo-boats. Of these vessels, the most formidable in point of armament were the two ex-German battleships Kheyr-ed-Din Barbarossa and Turgut Reis, purchased in 1910, presumably by way

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of reply to the Giorgios Averoff. There were also the battleships Messudieh, built on the Thames in 1874, and the Assar-i-Tewfik, built at La Seyne in 1868. Both of these vessels had been reconstructed, re-boilered, and re-armed, the former at Genoa in 1901, and the latter at Kiel in 1906. Of these four vessels, the two first-named carried in their heaviest armament six 11-in. Krupp and eight 4-in. guns each; the Messudieh two 9·2-in. and twelve 6-in. guns, and the Assar-i-Tewfik three 5·9-in. and seven 4·7-in. guns. Fighting as a squadron, these four ships could manœuvre at about 12 knots, but at that speed the two ex-German ships would have several knots in hand for a spurt. This squadron should certainly have been much more than a match for the three 5000-ton Greek coast defence vessels of the Hydra type, but they had neither the speed nor the range of the guns of the Giorgios Averoff. As a set-off against this vessel, there were the two fine protected cruisers Hamidieh and Medjidieh, built respectively in England and America. These useful ships, with two 6-in. and eight 4·7-in. guns each, and a speed of from 21 to 23 knots, might have been counted as fit to lie in the line in any engagement that could occur in a conflict between the two fleets. Apparently some of the older armoured vessels were stationed as guardships at the outlying ports, since the Italians sunk

The Turkish Fleet.

Name.	Class.	Where built.	Displacement.	Date of launch.	Nominal Speed.	Armament.
			Tons.		Knots.	
Kheyr-ed-Din Barbarossa	Battleship	Wilhelmshaven	9,901	1891	17	6 11-in., 8 4·1-in., 8 3·4-in.
Turgut Reis.	Battleship	Stettin (Vulcan)	9,901	1891	17	
Messoudieh.	Battleship	Thames, Genoa (reconstructed)	9,120	1874, 1902	17·5	2 9·2-in., 12 6-in.
Assar-i-Tewfik	Battleship	La Seyne.	4,613	1868	13	2 9·2-in. 6 6-in.
Feth-i-Bulend	Battleship	Blackwall.	2,720	1869	13	4 9-in., M.L.R.
Hamidieh	Pro. Cruiser	Elswick	3,800	1903	22·2	2 6-in., 8 4·7-in.
Medjidieh	Pro. Cruiser	Philadelphia	3,432	1903		
Berk-i-Satvet, Peik-i-Shevket	T.G.B.	Kiel (Germania)	740	1906	22	2 4-in., 6 6-pr.
Jadighiar-i-Millet, Muavenet-i-Millet, Mahabet-i-Watan, Nuhum-i-Hamijet	T.B.D.	Elbing (Schichau)	610	1909	35	2 3·4-in.
Samsoun, Basra, Tassos, Yar-Hissar	T.B.D.	Bordeaux. (Creusot)	280	1907-8	28	1 9-pr., 6 3-pr.
4 vessels	T.B.	Sestri Ponente (Ansaldo)	165	1906	27	2 1-pr.
4 vessels	T.B.	Bordeaux. (Creusot)	97	1906	26	2 M.

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the Avni-Illah, a reconstructed battleship of 2500 tons, in the harbour of Beyrout in February, 1912; and the Feth-i-Bulend, a somewhat similar battleship, was torpedoed by the Greeks at Salonika in October. In torpedo craft the Turkish effective force had been reduced by the war to four German destroyers of 1909 and four French of slightly earlier date, while the six or seven torpedo-boats remaining were either of French or Italian construction.

The Greek Fleet.

The Greeks are a maritime nation, and they have a varied naval history. They have produced able naval commanders like Canaris and Miaulis, whose names are commemorated in the Fleet, although in vessels which should now be replaced by more modern craft. It was questioned whether the Greek Navy would show itself inspired by the spirit of these fine seamen, and would discover opportunities for the display of similar qualities, or whether, as in the last Graeco-Turkish war, a policy would be adopted of ineffectual demonstration and abstention as far as possible from anything in the shape of enterprising initiative.

The recent development and reorganisation of the Greek Navy has been manifestly thorough, and the practical training of the effective fleet has shown the inspiration and experience of the British

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			Tons.		Knots.	
Averoff	Ar. Cruiser	Leghorn	9,956	1910	24	4 9·2-in., 8 7·5-in.
Hydra	Battleship	St. Nazaire	4,808	1889*	16	3 10·6-in., 5 5·9-in.
Psara	Battleship	Havre	4,808	1890*	16	
Spetsai	Battleship	Havre	4,808	1889*	16	
Naukratoussa, Thyella, Sphendoni, Lonchi	T.B.D.	Poplar (Yarrow)	350	1906	30	2 21-in. tor., 2 12-pr., 4 6-pr.
Nike, Aspis, Doxa, Velos	T.B.D.	Stettin (Vulcan)	350	1906	30	2 21-in. tor., 2 12-pr., 4 6-pr.
Aetos, Leon, Pardalos, Jerex	T.B.D.	Birkenhead (Cammell Laird)	980	1911	32	4 21-in. tor., 4 4-in.
Keravnos, Nea Genea	T.B.D.	Elbing (Schichau)	750	1912	32·5	2 18-in. tor., 4 3·4 in.
5 vessels	T.B.	Stettin (Vulcan)	85	1885	16	2 14-in. tor.
Delphin	Submarine	Creusot (Schneider)	400	1911	14	5 tor.

* Reconstructed at La Seyne, 1897–1900.

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to the Greek Government, with a number of other British naval officers as his assistants, and it was to the sound advice and skilful training of these instructors that credit for much of the success of the Greek Navy must be given. Before the war broke out, Admiral Tufnell had taken the Fleet for two cruises of six months' duration each, during which he had exercised it in manœuvres, gunnery, signals, general organisation, and the transport and landing of troops. It has been said that Admiral Tufnell wrote the signal book for the Greek Navy himself. Doubtless the Greeks may have regarded it as rather an invidious distinction that, whereas the British officers who were engaged as advisers to the Turkish Navy were permitted to remain on the active list, those who volunteered for service at Athens were obliged to retire. At all events, at the expiration of the engagement of Admiral Tufnell and his staff, a new contract was made, in which it was stipulated that their successors should be officers on the active list, and the new advisers are so. Before leaving the Ministry of Marine in May, 1913, Admiral Tufnell expressed his admiration for the services rendered by the Fleet during the war, and the efficiency shown both in the sea-going force and in the administrative departments on shore. The Admiral was decorated on his departure by the King of the Hellenes with the Cross of Grand Commander of the Royal Order of the Redeemer.

The Greek effective.

Through the generosity and patriotism of M. Giorgios Averoff, a fine armoured cruiser, built in Italy, was provided in 1910–11, and there must have been some regret felt during the war that, instead of providing for the construction of a sister-ship, another vessel of the same class had not been bought ready-built. The next best thing was done, however, for Greece entered the market and acquired four useful destroyers which had been built for the Argentine by Messrs. Cammell Laird, and which arrived in the Piraeus just after war was declared. Two other destroyers built in Germany were delivered about the same time. In addition to these vessels, the Greeks possessed several old gunboats which could be utilised in the Adriatic, eight older destroyers, four or five torpedo-boats, and a submarine. In her Mercantile Marine also she had the valuable assistance of many auxiliaries and transports, and it was not found necessary at any time to hire a single vessel flying a foreign flag.

The opening events.

As soon as the time for operation arrived, the Greeks made their strength at sea felt with an alacrity and readiness which showed that they had not only profited by their training, but had a plan of campaign and meant to put it into execution. The Fleet was organised in two divisions, a smaller consisting of eight gunboats, under Captain Damianos, for duty in the Gulf of Arta and on the

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coast of Epirus. The larger and more formidable consisted of the Averoff, Spetsai, Hydra, and Psara, fourteen destroyers, five torpedo-boats, and one submarine, with a number of auxiliaries and transports, including a hospital ship, a minelayer, and two distilling vessels, under the command of Rear-Admiral Paul Condouriotis. King George visited the ships of this division on Friday, October 18th, and bade his sailors "God speed." The same night the ships left the Piræus for Lemnos under sealed orders. They arrived on Sunday, the 20th, in Mudros Bay, and landed a force which, after a short engagement with the garrison, took possession of the island on the 21st. In continuance of the same movement, the following islands were occupied during the next few days—Thasos, Samothrace, Imbros, and Tenedos. The island of Lemnos is at a distance of only forty miles from the mouth of the Dardanelles, and in Mudros Bay the Greeks secured a convenient base from which to mask the entrance to the Straits. The other islands lie somewhat nearer the European shore. From this date the greater portion of the fighting ships remained outside the Dardanelles, and merchant ships leaving the Sea of Marmora found the Greek torpedo craft always about five miles from the entrance, where examination was made of suspected vessels for contraband. Behind the screen of ships, connected with one another and with Athens by wireless, movements of transports, etc., could be carried out free of molestation. Thus, to assist in the operations against Ellasona, a force was landed at Caterina Bay, about twenty miles north of the frontier, in order to cut off the retreat of the garrison towards Salonika.

Turkish guardship torpedoed.

On the night of October 31st, an exceedingly plucky and well-executed affair took place in the harbour of Salonika, where the Turkish guardship, Feth-i-Bulend, was torpedoed by No. 11 torpedo-boat, commanded by Lieutenant Votsis. The following is the official telegraphed report to the Minister of Marine, dated from Caterina Bay on November 1st:—

I left this morning the port of Litochoron, in the Gulf of Salonika, and arrived at Port Eleuterochore, where I remained until nine o'clock in the evening. From there I proceeded towards Salonika. The searchlights of Fort Kara Bournou swept the passage, but I succeeded in passing unperceived and continued at full speed, entering the port of Salonika at 11.20.

I saw a Turkish armoured vessel anchored on the right of the port, where warships are usually stationed. Near the guardship was anchored a Russian warship and other warships. I reduced speed and drew closer undetected, steering direct for the bow of the Turkish vessel. At 11.35, at a distance of 150 mètres, I fired a first torpedo. Still going slowly, but turning slightly to port, I fired a second torpedo, reversed engines, and went full speed astern. Before the torpedo exploded I noticed the warship had been struck. She listed suddenly to starboard. Thereupon I fired a third torpedo, which missed its mark and hit the rocks at the side of the port, exploding with such a formidable report that I thought the guns of the fort had opened fire upon my vessel.

Then the explosion of the first torpedo took place. I noticed a sudden appearance of lights aboard the Turkish warship, heard whistles calling the seamen to quarters, and saw the officers' quarters lit up. The torpedo struck the warship slightly

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forward of the funnel on the starboard side. A cloud of smoke shot up, and the vessel began to go down at the bow, with a strong list to starboard. Thereupon I ordered full speed ahead and came out of the port. I again passed the fort of Kara Bournou, which had been informed of our presence, for it turned on its searchlights. But I succeeded in passing the fort without being perceived. I continued my way to Katerina, arriving at four o'clock to resume my work of protecting the disembarkation of munitions and provisions for the land forces. (Signed) VOTSIS.

The Feth-i-Bulend, which was thus destroyed, was, as already described, an old but re-armed battleship of 2700 tons displacement. The greater part of the crew were saved, only seven people going down in the vessel.

Seizure of Mitylene and Chios.

Two more islands were seized by the squadron under Admiral Condouriotis in November. On Wednesday, November 20th, the following Greek ships arrived at Mitylene: Averoff, Spetsai, Hydra, and Psara (battleships); Jerex, Aspis, Velos, Niko, and Nea Genea (destroyers); with a torpedo-boat flotilla, the depôt ship Canaris, and three transports. The Nea Genea, a vessel presented to the Greek nation by Greeks in America, had just joined. At 7.30 A.M. an officer was sent ashore to demand the surrender of the place, but the garrison had retired to the interior. A landing party then took possession of the town, and hoisted the Greek flag. On Sunday, November 24th, the island of Chios was similarly occupied, a landing being carried out at Contari, to the south of the town of Castro, under cover of the guns of the squadron. The civil officials were removed from both islands, and military forces placed in charge of the government. It was not until December 22nd in Mitylene, and January 2nd in Chios, that the Turkish forces surrendered and opposition to the occupation of the islands ceased.

In the meantime, Salonika had surrendered to the Greeks on November 8th, and two days later the Bulgarians and Servians sent to assist at the capture arrived. As the Bulgarian division was required at Dede Agatch, the Greeks undertook to transport it to that port. The force consisted of the first brigade of the Seventh Division of the Bulgarian Army, and comprised the 13th and 26th regiments of infantry, with a squadron of cavalry and several batteries of machine guns. It embarked in nineteen Greek merchant ships and, escorted by the Greek Squadron, left Salonika on the morning of November 27th, arriving early next day at Dede Agatch, where the troops were put on shore in a few hours. The manner in which this operation was carried out testifies to the excellence of the organisation of the navy, and the rapidity with which the transports and their convoying vessels assembled at Salonika demonstrated the ample resources of the Greek Merchant Service. Every detail had been foreseen and every contingency provided for, including a specially fitted up tank ship with water for the horses. While the troops were

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being landed, a wireless message from the Greek ships watching the Dardanelles reported that one of the forts at the entrance had fired upon the destroyer Doxa, but without doing her any damage. That these operations should have been carried out without interference provides an object-lesson of the value of maritime strength and local superiority usefully employed.

Operations in the Black Sea.

During these two months, the Turkish ships did not put in an appearance at the Dardanelles, but were employed in the Black Sea. Just before the war began, the battleships Kheyr-ed-Din Barborossa and Turgut Reis, with two protected cruisers and some destroyers, were reported to be at anchor in Beikos Bay, just inside the Bosphorus. On October 17th some of the ships were sighted off the Bulgarian coast, and on the 19th two of them, accompanied by four torpedo craft, appeared off Varna. It is alleged that they were threatened by the Bulgarian torpedo-boats, and in reply fired upwards of a hundred rounds at the town, but, as most of the projectiles fell short, little damage was done. The squadron afterwards appeared at other points on the Bulgarian coast, and a complaint was made by the Bulgarians of the bombardment of the ancient monastery of St. Constantine, an act of vandalism which *The Times* representative at Sofia said that nothing could justify. The squadron then withdrew to Kavarna, an open town in the neighbourhood of Kali-akra, on which it fired, destroying a quantity of stores and doing other damage. According to the Bulgarian account, an attempt was made to effect a landing, but the boats sent in with this object met with such opposition as caused them to retire. On the 23rd the battleships Keyr-ed-Din Barbarossa, Messudieh, and Assar-i-Tewfik were despatched to support the cruisers and torpedo craft which had been blockading the Bulgarian coast. As the Bulgarian torpedo-boats threatened an attack, and were supported by the shore batteries, the Turkish ships opened a bombardment on three days upon the guard-house, customs offices, bridges, and harbour buildings. On the 24th the squadron appeared off Burgas and bombarded that port for a short time. Apparently these efforts were intended to indicate that the coast was blockaded, for there were no signs of transport for the conveyance of an expeditionary force. The battleships afterwards returned to the Bosphorus, leaving the torpedo flotilla and two cruisers to continue the blockade. Nothing more was heard of the blockading ships until November 21st, on the morning of which day, when about 15 miles from Varna, four of the Bulgarian torpedo-boats sighted the Turkish cruisers and made an attack on the Hamidieh. They discharged their torpedoes at the vessel at a range of about 2000 yards, and must have hit her in the forepart. As the other Turkish cruiser

Bulgarian torpedo-boats.

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and some of the destroyers came to the rescue, the Bulgarians, having put up a spirited and plucky fight, retired from the action. The Hamidieh had a narrow escape of foundering, but fortunately her forward bulkheads held. She was escorted back to the Golden Horn, arriving on the morning of the 22nd with her bows almost flush with the water. Whether there were any losses on the Bulgarian side was not known. The boats which made this attack must have been those built in France in 1908, each of which carries three 18-in. torpedo-tubes, but has only 3-pdrs. in the gun armament. During the remainder of November, the Turkish ships were principally employed in convoying transports from Sinope and Trebisond to Constantinople, and in the support of the flanks of the Tchatalja lines. Some of the warships took part in the battle of November 18th, when they manœuvred in the bay of Tchekmedji, in the Sea of Marmora.

Further operations at the Darda-nelles.

On December 1st nine Turkish ships arrived at the Dardanelles, and it was reported that, in deference to urgent representations, the Fleet was to give battle to the Greek Squadron. Although an armistice was arranged with the three northern Powers on December 4th Greece was not a party to it, and the naval operations continued. On the 11th the vessels were reported to be removing all inflammable fittings. Three days later, on Saturday the 14th, the Greek destroyers Sphendoni and Lonchi, under the command of Captain Hipitis, were reconnoitring off the entrance to the Dardanelles when they encountered a Turkish destroyer and at once gave chase. The forts opened fire, and the Turkish boat ran under their protection, The Turkish cruiser Medjidieh then appeared outside the Straits, and was attacked by the two destroyers which had already been in action, and also by two others, the Thyella and Naukratoussa, while at the same time a second division, consisting of the Velos, Doxa, and the Nea Genea, came in sight from the neighbourhood of Tenedos. The Medjidieh, having thus satisfied herself that the Greek blockading squadron was on the alert, retired, like the smaller vessel, under the shelter of the forts.

A further skirmish, in which the heavier vessels took part, occurred on December 16th. From the Turkish account, it would appear that the squadron left the Dardanelles soon after 8 in the morning, and, during a fight which lasted an hour and a half, exchanged shots with the Greek vessels at a range of from 3500 to 8500 yards. The Turkish vessels then retired to the Dardanelles, claiming that they had disabled the Giorgios Averoff. A fuller account, officially vouched for by the Greek authorities, was furnished to *The Times* by Lieutenant K. Gofton-Salmond, R.N., one of the members of the Greek Naval Mission, and is as follows:—

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The so-called battle was only a short skirmish of a few minutes' duration. At 9.30 A.M. the Turkish Fleet, consisting of four battleships or cruisers, nine torpedo-boat destroyers, and six torpedo-boats, appeared at the entrance of the Straits. The small craft remained there, and the four larger ships came out of the Straits and, keeping close to the land, turned towards the north. The Greek Fleet, also consisting of four armoured ships, coming from the island of Imbros, steered in a north-easterly direction, so as to cut across the course of the Turks. The Averoff, having superior speed, went on ahead, and the remaining three ships formed line abreast and waited for the enemy to come up. At 9.50 A.M. the Turkish ships opened fire at a range of about 15,000 yards. At 10 A.M. the Greek Fleet opened fire at a range of about 8000 yards. At 10.4 A.M. the Turkish Fleet altered course 16 points and returned as fast as possible and in broken formation to the Straits, which they entered about 10.30 A.M. Thus the total time during which either fleet was under fire did not exceed half an hour, and probably was only about 20 minutes. The torpedo craft took no part in the action, which merely resolved itself into a skirmish and was probably carried out in order to appease public opinion in Constantinople.

Although both sides claimed a victory in this action, and the Turks returned to their anchorage with the crews cheering and bands playing, it was actually no more than an inglorious and indecisive skirmish. The marksmanship was poor on both sides, but the Greeks were, if anything, rather superior in their manœuvring and initiative. The Turkish ships received practically no damage, but they only managed to put a few shells into the Averoff, on board which vessel several casualties occurred. This happened when the Greek cruiser closed to a nearer range and fired a torpedo, which missed. She ought then to have been sunk by the heavy fire of the Turkish vessels, but was not. The net result of the action was that the Turks withdrew to the protection of their forts, while the blockade of the Dardanelles remained effective.

Action of Jan. 18th.

Another sortie was made from the Straits on Sunday, December 22nd, the Turgut Reis and Medjidieh, with three destroyers, appearing in the direction of Tenedos. As soon as the Greek Squadron appeared, the Turkish ships returned to port. Nothing further of importance was reported until January 18th, when what appears to have been the chief conflict between the two fleets took place. At 9.50 on the morning of this day Admiral Condouriotis telegraphed by wireless :—

The whole of the Turkish Fleet has now come out of the Straits. We are going to meet it. The Turkish Fleet is composed of the battleships Haireddin Barbarossa, Turgut Reis, Messudieh, Assar-i-Tewfik, the cruiser Hamidieh (*sic*), and thirteen torpedo-boat destroyers and torpedo-boats; and the Greek Fleet of the battleships Hydra, Spetsai, Psara, and the armoured cruiser Giorgios Averoff and eight destroyers.

According to the report of the action telegraphed by the Governor of Tenedos, the engagement began at 11.25 A.M., and after a quarter of an hour the Turkish Fleet began to withdraw towards the north-west of Tenedos. At 1.10 P.M. the Turkish battleships turned towards the Straits, followed by the Giorgios Averoff, which exchanged fire with them at a range of about 3 miles. As the Giorgios Averoff overhauled the Turkish ships, they increased speed, and at 2.30 the action came to an end, as the Giorgios Averoff, had she

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continued the pursuit, would have been within range of the guns of the forts. On entering the Straits, both the Barbarossa and Turgut Reis appeared to be on fire, and at 5.10 P.M. Admiral Condouriotis sent the following wireless message:—

We have defeated the enemy's fleet, which was steaming towards Lemnos, and have pursued it almost to within the Straits, where it took refuge in disorder. The battle lasted three hours. We had only one man slightly wounded, and the Giorgios Averoff has insignificant damage. Our fighting power remains unaffected.

It was inferred, and on good grounds, that the Turkish authorities, in risking this battle, had been under the impression that the Greek Fleet might have left the neighbourhood of the Straits in pursuit of the Turkish cruiser Hamidieh, which vessel, after being repaired, had, on her own initiative and without permission of the Ministry of Marine, left the Straits on January 14th on an adventure to which reference will be made later. The Turkish Admiral, however, was mistaken, as Admiral Condouriotis had not sent any ships in pursuit of the cruiser, and, indeed, at the time appears to have been unaware of her escape, since he includes her name in the list of those in action on January 18th. Obviously, the Greeks mistook her sister-ship, the Medjidieh, for the missing cruiser.

The Greek marks-manship.

The Greeks remained concentrated off the Straits, and when the Turks ventured some distance outside, a long range engagement followed until the latter returned to their anchorage. Rear-Admiral Condouriotis once more proved himself a plucky and capable officer, and too much praise cannot be given to the excellent handling of the Greek ships during both actions, such as they were. On each occasion the Turkish vessels returned almost at once to the protection of their forts. Yet they were in each case superior in numbers and in weight of metal to the Greek ships. Their marksmanship, however, seems to have been still bad, while that of the Greeks had improved. Hardly any damage at all was done to the Greek ships, and not one of their guns was placed out of action. The Giorgios Averoff was excellently manœuvred and fought, and considering that the Fleet had been constantly at work day and night, with steam up since the beginning of October, it speaks well for all departments, especially when their previous want of experience is taken into consideration. Commodore Ghinis, the second-in-command in the Spetsai, and the Admiral's Chief of the Staff, Captain Dousmanis, also displayed marked smartness and ability. From the official reports it is manifest that all supplies of ammunition and stores had been regularly kept up from the base ports, and that wireless telegraphy proved invaluable throughout the campaign.

Reports from Constantinople of this engagement indicate that the

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Damage to Turkish ships.

centre turret of the Barbarossa was disabled, and all the men in it killed or wounded. The battleship Turgut Reis was damaged, but no other ship was hit. The Turkish losses were reported to be four officers and thirty-six men killed and 164 wounded. This is now known to have been an exaggeration.

The Assar-i-Tewfik was afterwards lost in the Kara Bunu in the Black Sea, where she ran aground in February and became a total wreck.

The cruise of the Hamidieh.

It has already been mentioned that the cruiser Hamidieh on January 14th evaded the Greek Squadron and slipped out of the Straits. She proceeded direct to Syra, where she found the Greek auxiliary steamer Macedonia refitting. This vessel, after being struck by several shells, was sunk to prevent capture. The Hamidieh also destroyed a powder factory, a coal depôt, and the electrical power station. Leaving Syra, the cruiser arrived at 2 A.M. on the morning of the 19th at Port Said, and after coaling and provisioning passed through the Suez Canal to the Red Sea. She was at Suez on the 24th, and left on the following day for a cruise in the Red Sea, from which she did not return until February 9th. After taking in water she returned through the Canal and made for the open Mediterranean, looking into Beyrout, and putting into Malta, owing, it was stated, to stress of weather, on the 15th. She was allowed to make good some small damage caused by the storm, and left after twenty-four hours on a cruise of her own again, during which she called at various ports and obtained sufficient coal and provisions to keep moving, according to the international law of nations. On March 11th she appeared off Durazzo, and fired some shells at the Greek encampment on shore, but apparently without effect. On the following day she was off San Giovanni di Medua. At this place she bombarded some Greek transports which were bringing Servian troops from Salonika for the assistance of the Montenegrins at Scutari. The action of the Hamidieh appears to have stopped temporarily, if it did not permanently put an end to, this movement. The cruiser afterwards left for Alexandria, where she was reported on March 16th. The next day she left, and appears to have been coaled from an Italian vessel off Beyrout. On April 8th–9th she again passed into the Red Sea, and about the same time a Greek squadron, consisting of the Hydra with two destroyers, accompanied by a collier, arrived off Port Said, their purpose being to prevent the cruiser re-entering the Mediterranean. Her headquarters in the Red Sea are said to have been at Kamaran, on the Arabian coast, but in June she visited Hodeida, and in July received orders to return to Constantinople. It was not, however, until August 24th that she again passed the

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Canal and left for the Dardanelles, after an absence of over seven months. On the Turkish side, her defection was regretted, particularly as in the action of January 18th she robbed the fleet of two 6-in. and eight 4·7-in. guns; while on the Greek side there were not enough vessels to be spared to hunt her down without leaving the Dardanelles free. It is said that the second officer of the Hamidieh was an Englishman, but her captain, Raouf Bey, certainly showed great pluck and enterprise in his daring raid. He had served on the staff of Sir Douglas Gamble. Although after his return he was subjected to much fulsome press adulation and municipal feasting, he appears not to have been unduly elated or spoilt thereby. It has been said that he is to command the new battleship completing at Armstrong's which the Turkish Government recently purchased from Brazil, and he should have a future before him in the Ottoman Navy.

It will not be necessary to follow closely the operations of the smaller Greek Division. This division was reinforced at the beginning of the war with a couple of gunboats, and its vessels entered the Gulf of Arta for the purpose of assisting in the blockade of Preveza and the Albanian coast. Half of the gulf belongs to Greece, and it was with the intention of effectively commanding its waters that the force was sent there, in order that it might assist the Army on its left flank in the advance to Yanina. Preveza was occupied on November 2nd, and later on a military division was brought in transports and landed at Santa Quaranta, opposite the northern end of Corfu, which operated with the Army until Yanina surrendered on March 6th. There was no fighting by sea in this quarter, but the blockading division showed great activity in suppressing the transport of contraband, and later on in conveying Servian troops to the ports in the Adriatic Sea.

International Fleet at Constantinople.

In consequence of the approach to Constantinople of the Confederate troops, and anxiety lest disturbances should be caused by the retreating and demoralised Turkish Army, it was decided, early in November, by the principal European Powers, with the concurrence of the Turkish authorities, to despatch warships to the city to afford naval protection to their nationals and the civil population, if necessary. The British vessels in the neighbourhood of the Dardanelles at this time included the eight battleships of the Third Battle Squadron, with their two attached cruisers, in addition to the ships of the Mediterranean Fleet and vessels temporarily on the station. The cruisers Hampshire and Weymouth were selected to pass through the Dardanelles to Constantinople, and they arrived off the Turkish capital on November 11th and November 5th respectively. The ships of other Powers ordered to the capital during the month

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included the French Leon Gambetta and Victor Hugo, the Italian Emanuele Filiberto and Coatit—which were followed by the Benedetto Brin on November 19th—the Austrian Aspern and Admiral Spaun, the German Goeben and Vineta, the Russian Rotislav and Kagul, and the Spanish Reina Regente. On the morning of November 18th an international force of about 3000 officers and men was landed, 497 of whom were contributed by the Hampshire and Weymouth. The force remained ashore until about the end of the month, but fortunately no untoward occurrences took place. The international squadron, however, remained in the Sea of Marmora for some time longer.

A peace conference was opened at St. James's Palace on December 16, 1912, but as the terms proposed by Turkey were not accepted by the Allies, the armistice was denounced on January 29th, and hostilities recommenced on February 3rd. On February 20th the Powers withdrew their warships from Crete, and this island passed into the hands of Greece, when the Fleet took possession. On April 15th an agreement was arranged between Bulgaria and Turkey for the cessation of hostilities, and it was made a condition that the Turkish Fleet should not prevent supplies from reaching the Bulgarian Army. In the meantime, on March 28th, the Powers demanded that the operations against Scutari should be suspended in order to enable the civil population to leave, and when Montenegro refused, it was decided to make a naval demonstration in the Adriatic. On April 5th an international squadron, consisting of one French, one German, two Italian, three Austrian, and two British war vessels, under the command of Vice-Admiral (now Sir) Cecil Burney, arrived off Antivari, and a blockade of the coast was declared on April 10th. Although no Russian vessels took part in the blockade, the Russian Government was in accord with these measures. On April 22nd Scutari surrendered, and as the Montenegrin Government showed no inclination to accede to the demands of the Powers, it seemed likely that military intervention would take place. However, on May 4th King Nicholas decided to yield, and ten days later the fortress was handed over to an international force consisting of 100 Germans, 200 French, 200 Austrians, 200 Italians, and 300 British bluejackets and marines under the direction of Vice-Admiral Burney. Peace was signed on May 30th, but the international force occupied Scutari for some few months longer.

With the subsequent outbreak of hostilities between Bulgaria and her allies, to the peace of Bucharest on August 10th, it is not necessary to deal in these notes, as the operations were on shore. The Greek Fleet remained based on Lemnos, watching the Dardanelles,

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and towards the end covering the movements of troops at or near Dede Agatch.

When, on the outbreak of war, another conflict by sea occurs, it is natural to anticipate that something hitherto missed or unexpected may happen to oblige us to modify the lessons taught in the past. From the above chronicle, brief as it necessarily is, there does not appear to be sufficient evidence from which to draw any very precise conclusions. The operations both in this war and in that between the Ottoman Empire and Italy may have something to teach of the influence of maritime strength when it can be exerted sufficiently to force the enemy to take shelter in his ports. It may also tell us something of the limitations of sea power. While Italy was able to drive the Turkish Navy off the seas, and to enforce a blockade which insured the unmolested transit of her troops and the security of her commerce, the exercise of her naval strength alone was unable to bring about a decisive result. Only the gradual beating down of resistance in Libya could do this. Similarly, in regard to the Balkan war, while the Greek Navy was able to assist the common interests of the Confederation, and was of great value, it could not of its own activity have brought about the result achieved by the battles on land. What is quite as true is that those battles might have resulted differently if the pressure of the Greek Fleet had not prevented the transport of troops and reinforcements from Asia Minor. The exercise of sea power was thus shown to have been of material advantage, and to have had an important bearing on the land operations. Upon questions of tactics or design, no new conclusions can be drawn from such meagre details, but the immense value of wireless telegraphy was demonstrated by its use by the Greek Admiral. Too much importance must not be attached to the escape and exploits of the Hamidieh. Nothing but the weakness of the Greek Fleet permitted such a raid, which, moreover, could have no material effect on the progress of the war.

CHAS. N. ROBINSON.

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CHAPTER IX.

THE GERMAN DOCKYARDS.

THE development of the material means whereby the German Fleet has been expanded and is maintained, both in the State Dockyards and the private establishments of the Empire, has necessarily kept pace with the increase of the Fleet itself. The private yards are vast organisations, displaying, in the essentials of direction, control, and administration, qualities of the highest order, and they are equipped with the fullest material resources, and are comparable in every way to our own. In the State Dockyards and the organisation that directs them, we have visible proof of that foresight, sustained purpose, and political wisdom which have distinguished German naval administration for many years past. We cannot withhold admiration from a system which has produced results so great and significant as are implied by the world-importance of the German Fleet. They well deserve to have some record and description in this place. It has been the high privilege of the writer, under the most favourable official auspices, twice to visit the dockyards at Kiel and Wilhelmshaven, to survey their departments, to estimate their resources, and have opportunities of gaining an insight into their system as the building, equipping, and mobilising bases of the Fleet. If he has not visited the dockyard at Danzig also, that has been owing to the want of opportunity, and not to any unwillingness of the German Imperial Navy Office to extend to him the facilities and courtesies so freely granted at the other and the more important yards, for which he should like here to place on record his high appreciation and gratitude. He has also had the opportunity of visiting nearly all the private yards, as well as the naval schools and establishments in Germany, which, however, are not the subject of this chapter.

Characteristics of the dockyards.

The German home dockyards are three in number—Danzig, Wilhelmshaven, and Kiel—and they are named in that order chronologically, Danzig dating from 1854, Wilhelmshaven from 1856, and Kiel from 1867, after Schleswig-Holstein had come under Prussian rule. Each of these naval bases has its own features of individuality. Danzig dockyard is the least important of the three as a shipbuilding

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establishment, being specialised almost entirely in the construction of submarines, small craft and auxiliaries, no large vessels having been built there since the "small cruiser" Emden was launched in 1908. By building small craft at Danzig, the larger yards are freed for other and more important work. Wilhelmshaven is in some respects the premier dockyard, and three Dreadnoughts have been built there. Kiel must, however, still hold the first place, because it has been chiefly identified with the administrative growth and modern history of the German Navy, and in a true sense has been its cradle, as it is now its real home. The construction and widening of the Kaiser Wilhelm Canal has given new importance to the dockyard, because it has thereby become a more ready base for the North Sea, while its position on the Baltic promises to give it new value in view of the coming development of the Russian Fleet.

Central administration.

Before entering upon any description of the dockyards it will be well to give some account of German dockyard organisation and administration, both in Berlin and at the ports. The yards are directly subordinate to the Imperial Navy Office (*Reichs-Marine-Amt*), and their object is defined as to construct ships for the Navy and to maintain them in all respects in readiness for service, and also to be responsible for the sufficiency, constitution, and proper distribution of all stores and auxiliary requirements both for the ordinary uses of the Navy and for mobilisation. At the Imperial Navy Office in Berlin is a Dockyards Department, under a director, which controls all dockyard business, and has sections or branches specially concerned with torpedoes, mines, booms, the *personnel* of the yards, the administration of matters relating to shipbuilding, machinery, the fitting, equipment, and commissioning of ships and vessels, and naval works and torpedo material. The Imperial Navy Office has also a Naval Construction Department, which deals through its branches with all that concerns shipbuilding, machinery, trials, and shipbuilding material. Another Department has charge of everything concerning ordnance and small arms, and the mounting of guns in ships and coast works, and the Department is responsible for the ordnance depôts. The heads of the Departments and certain professional, scientific, and technical officers have submitted to them questions that arise touching the design, construction, armament, and equipment of ships.

Naval construction.

These officers exercise very important duties and hold responsible positions, being, in a sense, collectively and individually, the colleagues of the chief constructors of the Navy. There is no single Director of Naval Construction as in the British Admiralty. When the designs

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have been prepared, the chief officials of the departments named assemble under the presidency of the State Secretary for the Navy to discuss the plans, and the financial department is represented with the object of examining the financial aspect of the proposals. The State Secretary, subject to the Emperor, is responsible for the types of ships, and the Admiral Staff has no official power of intervention, though, of course, in practice its influence is properly exercised. When the Emperor has approved the plans, estimates are prepared by the private shipbuilding yards and the dockyards, the latter acting as regulators of prices, and the State Secretary, looking to the situation in the dockyards and private yards, decides where the ships and vessels shall be built. The system with regard to the supply of guns and gun-mountings is somewhat different, owing to the monopoly held by the Krupp firm. The torpedo armament comes from the Government factory at Friedrichsort on Kiel Bay.

Dock-yard administration.

Each dockyard has as its chief a rear-admiral, with the title of *Oberwerftdirektor*, who answers to the British Admiral Superintendent. A captain, as Assistant Director, has charge of the general business, his position being analogous to that of a British Captain of the Dockyard, and he has a special duty in controlling the affairs of the dockyard workmen. A medical officer is attached to this department. Each department of the yard has its own Director, and in the Constructive and Engineering Departments technical officers, of whom there are three at Kiel, act as managers. The Fitting-out or Equipment Department (*Ausrüstungsressort*), which is directed by a captain, is responsible for supplying and preparing ships and vessels for sea, and all yard craft, cranes and appliances necessary for the duties are assigned to the department, which is responsible also for the condition of vessels not in commission. The Ordnance Department (*Artillerie-ressort*) works in the same way, but is not concerned with ammunition, which is administered by the ordnance depôts. The Torpedo Department is responsible for the repair, equipment, and general efficiency of the torpedo craft attached to the yard, and is also occupied with the storage, issue, and care of torpedoes for all ships and vessels attached to the port. At the two principal dockyards the Constructive and Engineering Departments are of great importance, and the former has control of docks and appliances. The Dockyards not being conducted on the same commercial principles as the private yards, the cost of shipbuilding in the Government establishments is usually somewhat higher than in private yards. There is a Works Department at each yard, and an Administrative Department deals with all administrative questions and dockyard expense accounts, and exercises financial control. The *personnel* is divided

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into the three branches of the dockyard officers and officials of various ranks, the operative class, and the administrative and accountant officials.

Kiel. The Prussian Government, in the sixties of the last century, contemplated the creation of a dockyard and naval base in the Island of Rügen, plans for which were prepared, but the advantages of the Kieler Föhrde, or Bay, were conspicuous, and the idea of a dockyard in Rügen was abandoned. The headquarters of the Baltic naval station were removed from Danzig to Kiel, an ordnance depôt was formed at Holtenau, near the opening of the present Kaiser Wilhelm Canal, and after the consideration of a possible site for the intended dockyard being found in that region, a decision was made for the present situation at Ellerbek, on the western side of the harbour. The advantages of easy railway communication, sheltered situation, and the near neighbourhood of Kiel, which made it unnecessary to build workmen's colonies, led chiefly to the decision, and the advantage of the decision is shown by the fact that two large private yards have been created and expanded on the same side of the harbour. The splendid Germania yard of the Krupp Company is on the south-west of the dockyard, and the Howaldt yard on the north, the latter separated from the State establishment by the Schwentine inlet. One element in the importance of Kiel resides in the fact that these three yards constitute, or may, in effect, constitute one vast dockyard, and that they can work in co-operation if required. Seven Dreadnought battleships out of nineteen have been built, or are building, in these three establishments, including one—the Kaiser—at the State yard.

General features. Interesting as must always be the history of a great dockyard, there is no space here to recount the successive steps and enlargements by which the Kiel naval establishment has become what it is. It was early decided that it would be necessary to form two separate basins—a tidal fitting basin and a building basin, the latter with four docks on its south side—besides three building-slips opening upon the harbour. The old König Wilhelm was the ship by which the width of waterways and the sizes of basins and docks were regulated, but even while the work of construction was in progress it was decided to widen the entrance canal and to deepen the fitting basin. Considerable enlargements have since taken place. A great impetus to the work at the yard was given in 1868, the building-slips being made ready. The battleship Friedrich der Grosse was laid down in 1870, but owing to the war could not be launched until 1874. The despatch vessel Grille was the first vessel to pass, in 1878, through the new harbour entrance to the fitting basin.

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The building basin is entered through a lock from the fitting basin, and a higher level of water can be maintained in it when required. On the east side of the building basin the boat and mast houses, the boat store, and some shops were erected, as well as the pumping plant and the electric power-house, and on the west side engine and boiler shops, iron and copper smithies, and the model house. Great improvements have been made in these places, and new plant has been installed. On the south are large shipbuilding and other shops and stores. On this side, too, are the principal offices of the yard. The storehouses for each ship (*Schiffskammern*) face the fitting basin, and there also are the gun, magazine and coaling berths. In 1886–90, the torpedo-boat harbour was formed, protected by a mole, about 1300 ft. long, on the north-east and north-west sides, and having on the land side the store and equipment houses for the boats, the torpedo store and the offices of the Torpedo Department. Provision was made for about seventy boats, and this is the position where the destroyers and submarines now lie in immediate readiness for service. In 1897 land was bought for the construction of two large dry docks, Nos. V. and VI., which open directly on Kiel harbour, on the south side of the yard, and are closed by pontoons. Considerable difficulties were found in the constructional work. Originally, the docking of vessels 460 ft. long was provided for, but, by means of a pontoon chamber attached at the fore end of the docks, ships of 580 ft. can be taken in. Off the southern end of the yard mooring-berths for big ships have been prepared, and in that direction is anchored the 40,000-ton floating dock, constructed in five sections and fitted with every requirement, which was built at the Howaldt yard in 1911. The dock has a special apparatus for drawing out from ships their propeller shafts for examination and repair. Another large floating dock is to be built, and will be begun this year.

Building and fitting basins.

Mobilisation stores.

At the other end of the dockyard land has been added, and ordnance stores, magazines, offices, and other buildings have been erected. The north and south parts of the yard are united by means of a lofty transporter-bridge for the transfer of men and stores from one side of the harbour entrance canal to the other. From the top of the lattice pillars of this structure a magnificent view is obtained of the dockyard, the two private yards, and the whole bay and its surroundings, which much impressed the writer, and he can say, from his own experience, that the transport from bank to bank on the suspended platform is very rapid and easy. The way round through the dockyard being long, and time being money, the expenditure of £38,000 on this work was amply justified. Off the northern part of

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the dockyard is the outer harbour, having a large area, inclosed on three sides, and capable of being closed on the other side by a boom. Here are mooring-berths for many ships.

Development of the yard.

It is hardly necessary to say that Kiel dockyard is provided with powerful plant and apparatus of the most modern character for shipbuilding, engine, and other work, including overhead, floating, and other cranes, and steam-hammers. Herr Marinebaumeister Grundt, to whom the writer is indebted for some particulars in this chapter taken from a paper contributed to *Deutsche Industrie-Deutsche Kultur* (ix., 12), stated that the effective horse-power employed in the yard, exclusive of that for steam-hammers and pumps, was 9100, as compared with 5414 at Wilhelmshaven and 1355 at Danzig.

The impression received from inspection of the dockyard at Kiel, as a shipbuilding, repairing, refitting, and mobilising base, is of its high efficiency. The battleship Kaiser, 24,300 tons, was laid down there in the late autumn of 1909, and completed for service in the summer of 1912. Small cruisers are built with rapidity and success. The repairing and refitting of vessels is carried on with celerity. The ships and vessels of the High Sea Fleet attached to the port are coaled and prepared for exercises and manœuvres with smoothness and rapidity. Everything that conduces to speed in mobilisation has been the subject of careful study and organisation. In the *Naval Annual* last year Captain von Kühlwetter showed the system of the reserves of officers and men, who are called to service and enrolled on mobilisation as the system adopted in the Army. In the dockyard every ship has her own storehouse, or *Kammer*, in which are all her requirements for mobilisation, save scientific instruments and ordnance and victualling stores. These *Schiffskammern* are closely adjacent to the positions where the ships lie, and in the case of destroyers each boat is tied up directly opposite to the storehouse assigned to her. The officers mobilising the vessels find everything required in these *Kammern*, inventoried and ready to be put on board. In writing of Wilhelmshaven something more will be said of this very interesting system. On the south side of the yard three very large magazines have been built for other classes of stores, and are in direct railway communication with the building and fitting basins, everything being arranged and inventoried with German thoroughness.

Docks.

The following are some particulars of docking accommodation at Kiel, showing the largest ships and vessels that can be admitted to the docks, extracted from tables given by Herr Grundt, but it must be noticed that ships of the largest size, in the case of need

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could be docked in the two enormous new locks of the Kaiser Wilhelm Canal at Holtenau.

—	Measurements of Largest Vessels that can be Docked.			
	Length.	Beam.	Draught.	Displacement.
	Feet.	Feet.	Feet.	Metric Tons.
DRY DOCKS—				
I.	418	67	27	..
II.	387	67	24	..
III.	367	61	21	..
IV.	361	58	15	..
V.	580	90	32	..
VI.	580	90	32	..
FLOATING DOCKS—				
I.	131	16	..	100
II.	295	43	..	2000
III.	262	26	..	600
IV.	262	26	..	600
V.	328	30	..	1800 or two of 900
VI.	656	131	..	40,000

In the *Naval Annual*, 1910 (pp. 114–117), some account was given of Wilhelmshaven Dockyard, with a plan showing the general features of the establishments. As was then said, enormous difficulties have been encountered and surmounted in the erection of this magnificent naval base. In the dreary sands, sedgy shallows, malarious flats, where no fresh water was, shifting banks, silting channels, high tides, and sometimes fierce storms of the North German coast, Nature did nothing to help the engineers who began and carried on the work, and whose successors were warmly thanked and congratulated fifty years later in a Cabinet Order by the Emperor William on June 25, 1906. Wilhelmshaven has, indeed, developed in a marvellous way, and though it is not so popular with the Navy as Kiel, yet its pleasant tree-sheltered roads, gardens, and park, and, above all, its delightful officers' casino, with charming club and recreation rooms, and beautiful shady garden at the rear, give some attractions that Kiel cannot boast. Wilhelmshaven.

The Oldenburg Government, as far back as 1849, saw the possibility of employing the Jade as a resort for ships, but in 1853 Prussia, after some difficult negotiations, took up the work, and an embanked *Steindeich* was built to hold back sea and sand, which has since been strengthened. The inner harbour was formed, with docks and works, but there was then no idea of erecting more than a dockyard in which ships could be refitted and repaired. The stone dike offered the first resistance to the elements and the tides, with *Wattland*, dry only at the ebb, behind it, and behind this again, Origin and development.

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the *Seedeich*, or wall. The place, which had hitherto been known as Heppens, received the name of Wilhelmshaven on June 17, 1869. By the year 1875 the purpose of building ships had taken root, and preparations were made for the work. After passing through the entrance lock and canal, the building basin was reached, with refitting works and stores at one end, and three docks and two building berths at the other. Successive naval plans, and what may be described as a *Drang nach Westen*, continued to increase the importance of Wilhelmshaven. A single entrance, with a lock that might be destroyed, could no longer suffice. Land was reclaimed from the sea, a new entrance was made on the south, with a basin providing berths for destroyers, and the old entrance canal was widened and formed into a fitting basin, which has since been enlarged on the north side. The close of the second building period was reached in 1886, but the Navy Law of 1900 followed, with its enormous requirements in building facilities, docks and harbours, and the construction of Dreadnoughts, and a new building period began in 1900–1901. Three additional large dry docks were constructed on the north side of the building basin, furnished with electric pumping plant for very rapid emptying. There was not space for other necessary additions to the Dockyard, and land was recovered from the sea on the north front. When the sea-wall for this purpose had been completed, the third and principal entrance was constructed, with two splendid entrance locks, approached between moles and closed by sliding pontoons, whereby the biggest ships can now enter in any state of the tide. While all this has been going forward, great changes have been made in the shipbuilding and engineering departments of the Dockyard, where there are new shops, including a large turbine factory, filled with modern and powerful plant. Floating and hammer-head cranes and every requirement for the efficient working of the yard have been provided. Meanwhile a most patient study has been made of the hydrographic conditions of the Jade, and much work has been done to check or curtail the drifting of the sands, which, by silting action, has involved immense dredging operations, and the yearly removal of detritus equivalent to a depth of about 33 ft. Thus by successive steps and the expenditure of large sums, Wilhelmshaven has risen to the rank of one of the most important dockyards in the world. It is a shipbuilding, refitting, and mobilising base of first-rate importance, and by the Ems-Jade canal—the opening of which on the south side of the Dockyard has been widened to fit it for dockyard purposes—it is in communication with Dortmund, Essen, the Westphalian coalfields and the Rhine.

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System of *Schiffskammern.*

Much that has been said concerning the organisation of the Dockyard service at the Imperial Navy Office and the administrative system at Kiel applies also to Wilhelmshaven. Some points, however, want a little further examination. At the present time, thirteen Dreadnought battleships, five battle-cruisers, two armoured cruisers, eighteen small cruisers, and a large number of destroyers belong to the North Sea Station, and therefore have Wilhelmshaven as their port of attachment. As soon as a ship is definitely assigned to the port, her *Schiffskammer* is organised, being, as has been described, her individual store, in which are assembled all the special and general equipments and stores that she can require, everything being catalogued and kept in readiness by a special staff. The advantage is conspicuous. When the ship is commissioned her equipment and stores are placed on board, and reserve supplies, as may be necessary, remain in the *Schiffskammer.* This special system, intended to promote very rapid mobilisation, does not perhaps possess all the value it formerly did, owing to so many vessels remaining in full commission, and the placing of ships in and out of commission not being so frequent as it was. Moreover, the system cannot be carried out completely. There are equipments, such as gun-sights, torpedo-fittings and nautical instruments, which require special care, and these are kept in special stores in which compartments are assigned—though not in every case—to individual ships. Other requirements of ships are heavy, such as anchors, and these are permanently attached to the ships, while reserve anchors are kept in a special place. Boats are also an exception to the system of separate *Schiffskammern,* the storage at Wilhelmshaven being in a large, light and airy magazine, whence they are placed in the water by travelling cranes, and taken alongside the ships. The rules in regard to the repairing and refitting of ships are very strict. A ship, except in case of necessity, must proceed to her port of attachment, which was not formerly the case. There was a time when Kiel was crowded with work, while Wilhelmshaven experienced slackness rather than pressure, but the new rules, and still more the assignment of more ships to the North Sea Station, have altered this situation.

Hydro-technical department.

The Departments (*Ressorts*) of the Dockyard and their offices are conveniently grouped in relation to the shops and factories employed in this work, with the exception that the office of the fitting department is situated on the building basin. It is unnecessary to describe their work in administration, fitting, equipment, navigation (instruments, chronometers, charts, etc.), ordnance and torpedo duties, shipbuilding, engineering and harbour work, but reference may

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be made to the *Strombau Ressort*, or "Current Forming Department," which has been separated from the Works Department, and has duties assigned to it special to the peculiar situation of Wilhelmshaven. It is occupied in the study of hydro-technical questions, and practically in efforts to improve the conditions of navigation in the Jade's fairways. Its investigations have been most exhaustive, and it has even constructed a special model, which the writer has seen, of the outer Jade, in order to discover, by creating artificial currents, the conditions that rule the shifting of the sands. It is hoped by sinking dams constructed of brushwood and wire, and loaded with stone and concrete, to form barriers, by the help of the eastward drift, which will direct the currents, and improve the conditions of navigation. This work is of enormous importance to Wilhelmshaven, where large sums are constantly expended in dredging operations, for which the yard is well equipped in the possession of dredgers and appliances. The Wilhelmshaven *Strombau Ressort* has also had the duty of studying like hydrographic conditions at Heligoland, and the works there have been executed as the result of its investigations.

Docks. For some of the above particulars the writer is indebted to an article contributed by Vice-Admiral Wodrig to *Deutsche Industrie—Deutsche Kultur*, and from the same article are taken the details of docking facilities which are subjoined, showing the maximum size of vessels that can be docked. A floating dock for the largest ships is to be attached for the Dockyard.

—	Length.	Beam.	Draught.	Displacement.
	Feet.	Feet.	Feet.	Metric Tons
DRY DOCKS—				
I.	420	67	24	—
II.	420	69	25	—
III.	371	58	20	—
IV.	614	93	33	31,000
V.	614	102	33	33,000
VI.	614	102	33	33,000
FLOATING DOCKS—				
I.	148	36	15	1,000
II.	213	36	15	1,000
FLOATING DOCKS FOR TORPEDO CRAFT—				
I.	238	25·5	15	620
II.	95	59	14	1,400
III.	100	59	14	1,400

In the largest of the floating docks for torpedo craft two boats can be docked together, side by side. The Dockyard has also several pontoons adapted for the docking of torpedo-boats.

Danzig. Although Danzig itself is a place of high antiquity, its history as

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a harbour of modern importance dates from the year 1840, when the Danzig arm of the Vistula broke through at Neufähr, converting the old river course to the west into a good harbour. The Prussian Government established a depôt for a corvette there in 1844. Four years later the place became a royal shipyard, and in 1850 the first warship, named the Danzig, was laid down at the yard, her engines and boilers coming from England. In 1854 Danzig became the headquarters of the Baltic naval station, and a number of corvettes and gunboats were built. A period of greater activity began in 1866, but Danzig as a dockyard lost importance with the growth of Kiel and Wilhelmshaven. After the Franco-German War, money became available, and with the improvement of water spaces and the building of engine and boiler works, the Dockyard entered upon a period of useful work. All these departments are now upon a much more important scale. Many difficulties have been encountered in the endeavour to make Danzig a valuable naval base. Docks of the ordinary character could not be constructed, but a harbour basin of irregular quadrangular form, about 350 ft. long, 125 ft. wide, on the side of the Vistula (to which it is open, but capable of being closed by means of a pontoon), and 243 ft. on the land side, was formed. This basin has the form of a segment of a circle on the land side, where three horizontal slipways were constructed, upon which vessels can be built and repaired, up to a weight of about 6300 tons. They are hauled off by hydraulic power into a floating dock, properly trimmed in the basin, and by this means can be put into the open water. In the same way vessels which cannot be repaired in the floating dock can be hauled up on one of the slips.

Work at the yard.

Although the Danzig Dockyard has been completely equipped in many ways, and, in the matter of fixed and floating cranes and all the plant for foundry, boiler, and engine work, and the requisites for ship and boat building, is, in its measure, comparable to the other dockyards, it has inevitably lost importance as a shipbuilding yard. The largest vessels ever built at the yard were the cruisers Freya and Vineta, 5660 tons, in 1895–7, and of more recent vessels, the cruisers Berlin, 3200 tons, Danzig, 3200 tons, Stuttgart, 3396 tons, and Emden, 3544 tons. Of auxiliaries, several colliers and harbour craft and a floating dock for torpedo craft have been built. The large floating dock has a maximum lifting power of about 6500 tons, and the dock for torpedo-boats of 600 tons. The yard is now employed largely in the building of submarines, and for this work a special slipway has been constructed. The Danzig Yard has also found a new field of activity in the building of flying machines, and it has a rapidly developing establishment at

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Putzig. If the Dockyard does not itself build the largest ships, it has a near neighbour in the great Schichau Yard, in which have been built the Dreadnought battleships Oldenburg and König Albert, and which has now in hand the Ersatz Wörth, which is to be completed in 1916.

This survey of the German dockyards has been written with the purpose of giving some indication of their history, but much more with the object of describing their resources as shipbuilding, repairing, and mobilising bases of the Fleet, and also of suggesting the system of their organisation and administration.

JOHN LEYLAND.

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CHAPTER X.

Naval Literature.

This vast subject might perhaps be divided into four parts, dealing with:—What has been written; what portion of it should be read; why and how it should be read; and what remains yet to be written. These are the chief questions which concern the naval officer on the active list, and he obviously is the person for whom it is most necessary to cater. Unfortunately, in practice, his point of view has been somewhat overlooked, and nothing is more common than to hear his bewildered voice asking what historical works he ought to read, and in what respect he will be the better for having read them.

Strangely enough, these two questions appear never to have been answered. Napoleon and many others have told us how necessary it is to read history, and how much they themselves have benefited from doing so, but none of them have told us why. As a result, the number of officers who are openly mistrustful of history is only exceeded by the number who use it to bolster up false or absurd analogies.

It is time, therefore, to state definitely—

Why and how we should read history.

The reason that this has been recommended to us by all great leaders in the past seems to be as follows. History shows us that "it is not ships that fight, but men." In other words, the result of battles is determined almost entirely by the qualities of intellect and character, from which the officers develop their powers of leadership and the men their courage, discipline, and loyalty. These qualities, developed by a lifetime of training and experience, will often determine the results of battles even before war is declared. They stand out just as conspicuously in the fleets of Nelson and of Howard as in the armies of Moltke or Cæsar. **Reason for reading history.**

Great leaders, perhaps, may dispense with much in the quality of their forces, but only because their genius enables them to inspire swiftly in their men those sentiments which others could produce only by laborious training. It is certain, however, that, whether we

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wish to produce a great genius or to be able to get on without one, the same process is necessary. Our officers must be persuaded to develop those qualities of intellect and character which history shows all great men to have possessed. By study and reflection, as well as by practical experience, they must develop their powers of leadership side by side with their professional knowledge, using the clear light of history as their constant guide.

A further value in history is that we can glean from it all the main principles of the art of war. We find that they are practically unchanging during the two thousand years of which we have accurate record, and that, when applied by intelligent and resolute leaders, they have led always to success. It is often argued that to know sound principles is a long way from being able to apply them in practice, and to understand the distinctive qualities of great leaders is not far towards being able to copy them; but it is here, essentially, that history shows us how great men in the past have overcome those difficulties, and have produced, even in times of peace, sound methods of individual and collective training which gave instant success in war.

Must be read with discretion.

Of this latter we can learn much from biographies, while a study of campaigns will show us again and again how situations of great uncertainty or danger have been met successfully by applying sound principles with swiftness and determination. There are certain directions in which history should not be used. For instance, it is futile and even harmful to cram the memory with dates and statistics of the type that we learnt at school about the kings of England. Those things are merely the lifeless bricks with which the great structure of history is built up. Sound ideas and great conceptions are what we must look for, just as we do when we study classic literature or some notable religion or philosophy.

Another dangerous use of history is to employ it for drawing modern analogies. The fact that Howard's ships were, on the whole, smaller than those of Medina Sidonia is not necessarily an argument in favour of small battleships. Nor is there any justice in arguing that we should not open fire at long range because British admirals often declined to do so in the past. Again, the fact of the Spanish Armada and the Allies at Trafalgar being both disposed in a crescent formation is no argument against the methods of enveloping tactics now somewhat often under consideration.

Another common fallacy is to attach undue importance to all "war experience," which leads often to deriving general principles from one isolated event. War experience may often be more misleading than the intelligent theory of peace; for example, the ram at Lissa, the

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mine in Mobile Bay, and the "capacity to endure pounding" of the Monitor, caused an exaggerated estimate of the value of those weapons or qualities which was quite unjustified.

So much for why and how to read history. We must now consider *what has been written and what should be read.*

In this there is great variety, for we have not only to review many types of literary production, but also to consider the individual taste of various readers and the special subjects that they may wish to study. In the category of readers we have no space to consider fully anyone but the naval officer, whose needs in studying naval warfare are certainly more urgent than those of the civilian. Now, one reader may have a taste for biographies, and prefer to get his knowledge of great leaders by studying a life of Nelson, Drake, or Stonewall Jackson; another may prefer the histories of battles or campaigns, which, after all, are practically biographies also. Again, one officer may turn to history and naval literature to make a study of naval administration, another may be studying tactics, or staff work, or strategy. Others may wish to examine cruiser work, or blockades, or trade problems. Allowing, therefore, for those special requirements and for individual taste, it would be quite impossible, as well as invidious, to say what particular works are most to be recommended to the present generation of naval officers. One can only summarise the different types of literature that exist, and point out the advantages of each. Variety of works and of tastes.

There are, roughly, six types which are of direct interest to the naval student, viz.:—

1. Biographies. These are strongly recommended to officers who like this form of history. They may be of great value provided that the reader will take active steps to benefit personally by the lessons that he learns from them. From Plutarch onwards there are numerous writers who have compiled for us lives, not only of great sailors, but also of famous soldiers, statesmen and philosophers, which all may be read with advantage. Great men, in fact, have so much in common that men such as Pitt, Bismarck, Richelieu, Cromwell, Marlborough, or Turenne are not greatly dissimilar from our foremost naval leaders. Biographies.

2. Next come historical works proper, compiled by historians and civilians. In this direction naval literature is well supplied with much admirable material. From Herodotus, in the past, we have had a steady and increasing supply down to the modern writers, whose names will occur to everyone. But in the works of such writers there is this limitation, that the duty of a historian is to write Histories by civilians.

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History, which has no concern with the future, but is confined solely to records of the past. A historian (take, for example, Gibbon) is successful when he has given us an interesting and accurate picture of the events, customs and ideas of a certain period in history. It is often essential that the historian should go into great detail, which precludes brevity. James' "Naval History," as history, is perhaps admirable; but as a historical work to be placed in the hands of a young naval officer it is entirely unsuitable. It is too long; it is full of unimportant details, and it makes no attempt to show up in bolder relief the principles, decisions, and personalities which mainly determine the course of each campaign. To the naval officer the reading of history is a means not an end; and his needs from it are of a particular not a general nature. It is of much interest to him to know why a decision was made and what results arose from it, and this he can obtain from history fairly easily. But it is of far greater interest to him to know if the decision was good or bad; what alternative decision might have been come to; if good, what principles was it based upon; if bad, what principles did it violate.

Deductions must not be made by the individual.

It may be argued that an officer should deduce these things for himself and not have them presented to him cut and dried. But that system has been tried and has failed; it leads to no unanimity of opinion, for each officer makes different deductions. Many read history without attempting to deduce anything from it, looking on it merely as an end and not a means; many find that the principles they are looking for are so buried under masses of historical sawdust that they give up in despair; many assert that it is now impossible to find time for so laborious a process.

Must be left to the expert naval officer.

Hence it has become necessary that something more should be given to them, and what they require can only be produced by the expert naval officer who has spent his whole life studying naval warfare while in close touch with the practical side of his profession and with the current opinions circulated among his contemporaries. By this means alone can sound principles be inculcated among readers of history, and though there is the obvious danger that officers may accept unthinkingly any views thus presented to them, even this would be far better than the complete absence of useful knowledge obtained at present by our younger officers from the treasure-house of History. As a matter of fact, the danger can be entirely obviated by explaining the need for eyeing critically and even distrustfully anything in the nature of a dogmatic opinion presented to us in print.

As an example of one type which we lack almost entirely in naval literature, one might quote Col. Henderson's "Stonewall Jackson." Here we have, combined in one book, a fine biography, a brilliant

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history of a most interesting campaign, and a masterly criticism and commentary on all the principal factors which influenced the final results. Surely the most narrow-minded could not contend that it might be harmful to read such a book as this? It could be no more argued that a beginner at bridge should not read a book of hints and principles compiled by an expert player. Not to do so is to decline the advice of all the experts who might be able to help and, though we all know that experts may often be wrong, yet nothing could be so slow and clumsy as to be continually working out for ourselves simple truths that have been known for 1000 years.

Works by naval officers.

3. We come now to the third class: Works by naval officers. Throughout the whole world the shortage of books of this class is surprising, but in England, whose great seamen have been so numerous, the small amount that they have left behind them is really amazing. Of well known modern authors, while it may be said that their writings are certainly most valuable, none of them have actually seen war on a large scale, and some have adhered rather closely to the methods of the historian, giving us but little of what might be called their expert knowledge of the art of war. At all events, there is room for vast additions to this class of naval literature, particularly when we compare it with that which has been provided for the Army.

Works by military officers.

4. In the fourth class we put the leading works by military writers, which are all of very considerable value to the naval officer. These writings form the foundation of military literature, and they carry with them the weight of names which have made history as well as writing it. Names such as Cæsar, Jomini, Napoleon, Kraft, Moltke, Napier, Henderson, Von der Goltz, Wolseley, Clausewitz—to quote at random a small number out of those that at once occur to us. Even if we go back to "The Book of War," written about 400 B.C. by the Chinese Generals Suntzu and Wutzu, we recognise at once the workmanship of two enlightened minds which have meditated deeply on the art of war besides having actually led armies in the field. Their work now is very crude to our eyes, but it is by no means uninstructive.

By reading military works we can get a very clear idea of the main principles of strategy, their relation to policy, the importance of morale, the value of the offensive, etc.; and though these things can be learnt equally from naval literature, it is not without value to widen one's horizon by comparing the Army standards with our own. We would therefore recommend the young naval officer not to omit a few military works, such as Henderson's "Stonewall Jackson,"

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parts of Clausewitz's "On War," (including the summary of his instructions to the Crown Prince), and the first five chapters of "Reflections on the Art of War," by Sir Reginald Hart, V.C. These military items are, of course, not strictly within the scope of our subject, but before passing on it may be remarked that there is also great value in the reading of any first-class literature that deals with the character and the minds of men. Almost all results in war are dependent on the directing intellects in the opposing forces, and therefore there is real utility in reading the works of such men as Shakespeare, Bacon, Goethe, Machiavelli, Herbert Spencer, and even some of the philosophers and psychologists.

Works on current problems by other than naval officers.

5. In the fifth class we put works dealing with current problems of strategy, tactics, policy, etc., but not written by naval officers. These are often of great value for educating the public, but are not as a rule recommended to the profession. The writers are rarely *au fait* with the technical factors which bulk so largely in such problems, nor have they often made a full enough study of the intricacies of naval strategy.

Several of these works display careful study and good theoretical knowledge—up to a point. But in nearly all there is indicated at times some lack of that necessary combination of mature judgment and professional knowledge, which can scarcely be acquired without a lifetime of careful training based on practical experience at sea.

Works on technical subjects.

6. The last class of naval literature is that dealing with technical subjects. Many interesting books have been compiled on subjects such as submarines, guns and armour, engineering problems, and the many branches of modern science that we make use of afloat. But these books do not properly come within the scope of the student of naval literature. They rapidly become obsolete. There is a large number of similar books issued by the Admiralty, and dealing as they do only with the material side of the profession, they must always rank subordinate to those directly concerned with the human element. Pope's dictum that "the proper study of mankind is man" applies nowhere more forcibly than in the naval service, but the immense development of technical requirements has tended somewhat, during recent years, to obscure that truth. It is not argued that the study of material can be neglected. On the contrary, it is most important, but that is a part of the technical knowledge which can be acquired practically, and is not dependent on the producers of naval literature.

Room for more historical works.

We come now to the last point: *What necessary additions to naval literature remain yet to be written?*

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In nearly all branches it may be said that there already exists amply sufficient to meet the simple needs of the naval officer. In some cases there is already an *embarras de richesses*, but this does not mean that no more need be written. There are quite sufficient works now in print to teach any reader all the main lessons that can be learnt from history; but there will always be new historical facts to be brought to light, new campaigns to describe, new methods to find of presenting the old methods more concisely or more attractively. Also, there is room for much useful work in examining more fully the older campaigns and making good the lacunæ and inaccuracies of the older historians. There is, however, one great need which unfortunately can only be supplied by expert naval officers whose attainments and professional reputation are of the highest calibre.

Navy greatly in need of works by its own officers.

What is needed is that they shall produce for the Navy what the great military writers have produced for the Army. The difficulty is that such men are urgently required to fill important appointments, and their time cannot be spared for literary work. There are, however, but few men in a generation who are qualified to perform such work, and it cannot be too strongly emphasised that, if the Admiralty will set themselves to have it attended to, the benefit to the Naval Service will be enormous. A careful consideration of the case will show that the Navy has waited far too long for that form of historical guidance which it has every right to expect, and which at the present day is one of its most urgent needs.

What is required, then, is a large addition to Class 3, which comprises historical, biographical, or other works on the art of naval warfare written by expert naval officers.

There is no need that they should be very voluminous; they might range from a large book to a short essay, but the ground waiting to be covered by them is enormous.

The following are a few of the subjects that they might deal with:—

The main principles of naval warfare as deducted from history: illustrated with historical examples.

The accepted principles of naval warfare: how to be applied at the present day, and to what extent modified by modern weapons.

The various units of naval warfare and their weapons; a description of their limitations and capabilities as applied to the strategical and tactical problems of the present day.

The main thesis of Clausewitz's book "On War" rewritten and adapted to modern naval warfare.

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A comparison of naval and military strategy, with an examination of their differences and points of resemblance.

The principles of naval tactics as deducted from history, pointing out to what extent they are modified by the weapons of the present day.

The elements of naval strategy and tactics: for beginners.

Staff work and staff training in the modern Navy.

Higher education in the art of war; dealing with the study of strategy, the art of command, moral and psychological factors, the relative value of material, etc., etc.

Any item on the above list would provide material for a book of absorbing interest, if sufficiently well written. Nor is there any reason to suppose that the Navy could not produce the men to write it, if the authorities will encourage them to do so. As matters stand at present, it might be necessary for some of the books so produced to be circulated confidentially to naval officers only, for much of our scientific material is treated as secret. It may be that this secrecy has in the past been rather overdone, but even with this limitation the Navy would benefit none the less, though the public might see little of the improvement. It is not necessary, however, that the public should scrutinise every thought and action; it should suffice that the Navy achieves the improvement while the public reap the benefit of it in greater security. To the public these books are often of no more than passing interest, but to the Navy they are the foundation on which it is hoped an efficiency may be built up, increasing steadily to the farthest limit that human ingenuity can attain. In so doing, the study of history and the production of useful additions to our naval literature will be factors of supreme importance.

A NAVAL OFFICER.

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PART II.

LIST OF BRITISH AND FOREIGN SHIPS.

BRITISH AND FOREIGN AIRSHIPS.

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PART II.

LIST OF BRITISH AND FOREIGN SHIPS.

THE following abbreviations are used throughout the Alphabetical List:—

a.c. Armoured cruiser.
a.g.b. Armoured gunboat.
b. Battleship.
b.cr. Battle-cruiser.
l.cr. Light cruiser.
c.d.s. Coast-defence ship.
comp. (in armour column). Compound or steel-faced armour.
cr. Cruiser.
A.A. Anti-air-craft guns.
d.v. Despatch vessel.
g.b. Gunboat.
g.v. Gun-vessel.
H.S. Harveyised or similar hard-faced steel.
K.S. Krupp steel.
shd. Sheathed.
P. Protected.
t. Turret-ship (in class column).
t. Speed and I.H.P. at trials (in speed and I.H.P. columns).
to.cr. Torpedo-cruiser.
to.g.b. Torpedo-gunboat.

l. Light guns under 15 cwt., including boats' guns.
M. Machine guns.
sub. Submerged torpedo tube.
A. Armstrong guns. K. Krupp guns.

The following abbreviations are used to distinguish the various types of boilers:—

W.T. Water-tube boilers, where the type is not known.
B. Belleville.
Bl. Blechynden.
B. & W. Babcock and Wilcox.
D'A. D'Allest.
D. Dürr.
E. Earle.
Ex. Express.
Du T. Du Temple.
L. Laird.
L.N. Laird-Normand.
M. Mumford.
My. Myabara.
Nic. Niclausse.
Nor. Normand.
N.S. Normand-Sigaudy.
R. Reed.
T. Thornycroft.
T.S. Thornycroft-Schulz.
W.F. White-Forster.
Y^1. Yarrow small tube.
Y^2. Yarrow large tube.
V.E. Vickers Express.
cyl. Cylindrical.

The following abbreviations distinguish types of turbines:—

P.T. Parsons. C.T. Curtis.

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GREAT BRITAIN.—Armoured Ships.

Class	NAME.		Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Makers of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Second-ary.	Armament. Guns	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
			tons.	ft.	ft.	ft.						£	in.	in.	in.	in.	in.	in.			knots.	tons.	
a.c.	**Aboukir**	shd.	12,000	440	69½	26¼	21,375 B.	Govan	Fairfield	1900	1902	751,118	6–2 K.S.	3–1½	..	5 H.N.	6 K.S.	5	2 *9·2-in.*, 12 *6-in.*, 12 *12-pr.*, 3 *3-pr.*, 8 M., 2 l.	2	21·6 *t*	800/1600	755
a.c.	**Achilles**		13,550	480	73½	27	23,275 Y² & cyl.	Elswick	Hawthorn	1905	1907	1,191,103*	6–4–3 K.S.	¾–1	6	6	6	6	6 *9·2-in.*, 4 *7·5-in.*, 24 *3-pr.*, 2 M.	3	23·27 *t*	1000	704
b.	**Africa**		16,350	425	78	26¾	18,698 B. & W. & cyl.	Chatham	J. Brown	1905	1906	1,461,429*	9 H.S.	2–1	8–7	12 H.S.	12–6 H.S.	7 K.S.	4 *12-in.*, 4 *9·2-in.*, 10 6-in., 12 *12-pr.*, 12 *3-pr.*, & M.	4	18·95 *t*	950/2150	825
b.	**Agamemnon**		16,500	410	79½	27	17,285 Y²	Dalmuir	Hawthorn Leslie	1906	1908	1,651,289*	12–6 K.C.	2	8	8	12	7	4 *12-in.*, 10 *9·2-in.*, 24 *12-pr.*, 2 *3-pr.* & 5 M.	5	18·75 *t*	900/2500	865
b.	**Ajax**		23,000	555	89	27½	28,000 B. & W.	Greenock	Scott P.T.	1912	1913	1,937,631 *	12–6	..	9	..	10	..	10 *13·5-in.*, 16 4-in., 4 *3-pr.*	3	22 *t*	900	900
b.	**Audacious**						28,700 Y²	Birkenh'd	Cammell Laird P.T.	1912	1913	1,965,307 *											
b.	**Albemarle**		14,000	405	75½	26½	18,296 B.	Chatham	Thames Ironworks	1901	1903	1,009,835	7–3 K.S.	2–1	7	7 K.S.	11 K.S.	6 K.S.	4 *12-in.*, 12 *6-in.*, 10 *12-pr.*, 2 *3-pr.*, & M.	4	18·6 *t*	900/2000	750
b.	**Albion**		12,950	390	74	26	13,885 B.	Blackwall	Maudslay	1898	1902	858,745	6–2 H.N.	3–1	6	12–8 H.N.	12–6 H.N.	5 H.N.	4 *12-in.*, 12 *6-in.*, 10 *12-pr.*, 6 *3-pr.*, & M.	4	17·8 *t*	800/2300	700
a.c.	**Antrim**		10,850	450	68½	25	21,604 Y. & cyl.	Clydeb'nk	J. Brown	1903	1905	906,335*	6–2 H.N.	2–¾	..	4½ H.N.	6 H.N.	6 H.N.	4 *7·5-in.*, 6 *6-in.*, 20 *3-pr.*, 2 M.	2	23·02 *t*	800/1950	655
a.c.	**Argyll**						21,190 B. & W. & cyl.	Greenock	Greenock Foundry	1904	1906	906,308*									22·38 *t*		

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a.c.	**Bacchante** shd.	12,000	440	69½	26¼	21,520 B.	Clydeb'nk	J. Brown	1901	1902	787,230	6–2 K.S.	3–1½	..	5 H.N.	6 K.S.	5	2 9·2-in., 12 6-in., 12 12-pr., 3 3-pr., 8 M., 2 l.	2	21·75 t	800 1600	755
b.	**Barham‡**	27,500	600	90½	28¾	60,000	Clydeb'nk	J. Brown P.T.	Bldg.	..	..	13	..	..	..	10	..	8 15-in., 12 6-in.	..	25	Oil	..
b	**Bellerophon**	18,600	490	82	27	23,000 B. & W.	Portsm'th	Fairfield P.T.	1907	1909	1,765,342*	11-6-4 K.C.	..	8	..	11 K.C.	..	10 12-in, 16 4-in., 4 3-pr & M.	3	21·80 t	900	780
b.	**Benbow**	25,000	580	90	28	29,000	Dalmuir	Beardmore P.T.	1913	..	2,027,115	12	..	9–8	..	..	..	10 13·5-in., 12 6-in., 2 3-in. A.A., 4 3-pr.	4	21	900	..
a.c.	**Berwick**	9800	440	66	24½	22,681 Nic.	W. Beardmore & Co.	Humphrys	1902	1903	750,984	4–2 H.S.	2¾	..	5 N.S.	5–4 N.S.	4 N.S.	14 6-in., 8 12-pr., 3 3-pr., 9 M.	2	23·61 t	800 1600	537
a.c.	**Black Prince**	13,550	480	73½	27	23,939 B. & W. & cyl.	Blackwall	Thames Ironworks	1904	1906	1,193,414*	6–4–3 K.S.	¾–1	6	6	6	6	6 9·2-in., 10 6-in., 20 3-pr., 2 M.	3	23·65 t	1000 2000	704
b.	**Britannia**	16,350	425	78	26¾	18,725 B.& W.& cyl	Portsm'th	Humphrys	1904	1906	1,450,757*	9 H.S.	2–1	8–7	12 H.S.	12–6 H.S.	7 K.S.	4 12-in., 4 9·2-in., 10 6-in., 12 12-pr., 12 3-pr., M.	4	18·74 t	950 2150	825
b.	**Bulwark**	15,000	400	75	26¾	15,000 B.	Devonp't	Hawthorn	1899	1902	997,846	9 H.S.	3–2	3 K.S.	12 H.S.	12–5 H.S.	6–2 K.S.	4 12-in., 12 6-in., 16 12-pr., 2 3-pr., & M.	4	18·15 t	900 2000	781
b.	**Cæsar**	14,900	390	75	27½	12,000	Portsm'th	Maudslay	1896	1897	885,212	9 H.S.	4–2½	9	14–9 H.S.	14–6 H.S.	6 H.S.	4 12-in., 12 6-in., 16 12-pr., 4 3-pr., 2 M., 2 l.	5	18·7 t	900 2000	757
b.	**Canopus**	12,950	390	74	26	13,500 B.	Portsm'th	Greenock Foundry	1897	1899	866,516	6 H.N.	3–1	6 H.N.	12 H.N.	12–5 H.N.	5 H.N.	4 12-in., 12 6-in., 10 12-pr., 6 3-pr., & M.	4	18·5 t	800 1850	700
a.c.	**Carnarvon**	10,850	450	68½	25	21,489 Nic.&cyl.	Beardm're	Humphrys	1903	1905	890,840*	6–2 K.S.	2–¾	..	4½ K.S.	6 N.S.	6	4 7·5-in., 6 6-in., 20 3-pr., 2 M.	2	23·3 t	800	655
b.	**Centurion**	23,000	555	89	27½	28,200 Y²	Devonp'rt	Hawthorn P.T.	1911	1913	1,939,648*	12–6	..	9	..	10	..	10 13·5-in., 16 4-in., 4 3-pr.	3	22 t	900	900
a.c.	**Cochrane**	13,550	480	73½	27	23,654 Y² & cyl.	Govan	Fairfield	1905	1907	1,193,121*	6–4–3 K.S.	¾–1	6	6	6	6	6 9·2-in., 4 7·5-in., 24 3-pr., 2 M.	3	23·29 t	1000	704
b.	**Collingwood**	19,250	500	84	27	24,500 Y²	Devonp't	Hawthorn P.T.	1908	1910	1,731,640*	10–6–4	¾–1¾	8	..	9	..	10 12-in., 18 4-in., 4 3-pr., 5 M.	3	21·5 t	900	724
b.	**Colossus**	20,000	510	85	27	25,000 B. & W.	Greenock	Scott P.T.	1910	1911	1,672,663*	11–3	2½	8	..	11	..	10 12-in., 16 4-in., 4 3-pr., 5 M.	3	21·5 t	900	780

* Total estimated cost of ship including guns.

‡ Particulars unofficial.

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GREAT BRITAIN.—Armoured Ships—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Date of Completion.	Cost	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Second-ary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.						£	in.	in.	in.	in.	in.	in.			knots.	tons.	
b.	**Commonwealth**	16,350	425	78	26¾	18,538 B & W & cyl	Govan .	Fairfield .	1903	1905	1,481,811*	9 H.S.	2–1	8–7	12 H.S.	12–6 H.S.	7 K.S.	4 *12-in.*, 4 *9·2-in.*, 10 *6-in.*, 12 *12-pr.*, 12 *3-pr.*, M.	4	19·01 *t*	950 2150	825
b.	**Conqueror** .	22,500	545	88½	27½	29,835 B. & W.	Dalmuir .	Beardmore P.T.	1911	1912	1,885,295*	12	..	9	..	10	..	10 *13·5-in.*, 16 *4-in.*, 4 *3-pr.*, 5 M.	3	22·12	900 2700	800
a.c.	**Cornwall** . . .	9800	440	66	24½	22,699 B. & W.	Pembroke	Hawthorn	1902	1904	756,274	4–2 H.S.	2–¾	..	5 N.S.	5–4 N.S.	4 N.S.	14 *6-in.*, 8 *12-pr.*, 3 *3-pr.*, 9 M.	2	23·68 *t*	800 1600	537
b.	**Cornwallis**	14,000	405	75½	26½	18,238 B.	Blackwall	Thames S. Co.	1901	1904	1,030,302	7 K.S.	2–1	7	14 K.S.	11–6 K.S.	6 K.S.	4 *12-in.*, 12 *6-in.*, 10 *12-pr.*, 2 *3-pr.*, & M.	4	18·9 *t*	900 2000	750
a.c.	**Cressy** . shd.	12,000	440	69½	26¼	21,240 B.	Govan .	Fairfield .	1899	1901	749,324	6 K.S.	3–2	..	5 K.S.	6 K.S.	5 K.S.	2 *9·2-in.*, 12 *6-in.*, 12 *12-pr.*, 3 *3-pr.*, 8 M., 2 l.	2	20·79 *t*	800 1600	755
a.c.	**Cumberland** .	9800	440	66	24½	22,000 B.	Glasgow	London & Glasgow Co.	1902	1904	718,168	4–2 K.S.	2–¾	..	5	5–4	4 N.S.	14 *6-in.*, 8 *12-pr.*, 3 *3-pr.*, 9 M.	2	23·68 *t*	800 1000	537
a.c.	**Defence** . .	14,600	490	74½	26	27,570 Y²	Pembroke	Scotts S. & E. Co.	1907	1909	1,383,744*	6–4	1–½	3	..	8	7	4 *9·2-in.*, 10 *7·5-in.*, 16 *12-pr.*, 5 M.	5	23·5 *t*	1000	850
a.c.	**Devonshire** .	10,850	450	68½	25	21,475 Nic. & cyl.	Chatham	Thames Ironworks	1904	1905	850,877*	6–2	2–¾	..	4½ K.S.	6 N.S.	6	4 *7·5-in.*, 6 *6-in.*, 20 *3-pr.*, 2 M.	2	22·97 *t*	800 1600	655
b.	**Dominion** .	16,350	425	78	26¾	18,438 B. & W. & cyl.	Barrow .	Vickers .	1903	1905	1,455,190*	9 K.S.	2–1	8–7 K.S.	12 K.S.	12–6 K.S.	7	4 *12-in.*, 4 *9·2-in.*, 10 *6-in.*, 12 *12-pr.*, 12 *3-pr.*, M.	4	19·5 *t*	950 2150	825
a.c.	**Donegal** . .	9800	440	66	24½	22,173 B.	Govan .	Fairfield Co.	1902	1903	715,947	4–2 K.S.	2–¾	..	5 K.S.	5–4	4 K.S.	14 *6-in.*, 8 *12-pr.*, 3 *3-pr.*, 9 M.	2	23·56 *t*	800 1600	537
a.c.	**Drake** . .	14,100	500	71	26	31,450 B.	Pembroke	Humphrys	1901	1902	1,002,977	6 K.S.	3–2	..	5 K.S.	6–5 K.S.	5 K.S.	2 *9·2-in.*, 16 *6-in.*, 12 *12-pr.*, 3 *3-pr.*, 2 M.	2	24·11 *t*	1250 2500	900
b.	**Dreadnought**	17,900	490	82	26½	27,500 B. & W.	Portsm'th	Vickers . P. T.	1906	1906	1,813,100*	11–6–4 K.C.	2¾–1¾	8	..	11	..	10 *12*-in., 24 *12-pr.* Q.F., 5 M.	5	21·85 *t*	900 2700	770
a.c.	**Duke of Edinburgh**	13,550	480	73½	27	23,685 B. & W. & cyl.	Pembroke	Hawthorn Leslie	1904	1906	1,201,687*	6–4–3 K.S.	¾–1	6	6	6	6	6 *9·2-in.*, 10 *6-in.*, 20 *3-pr.*, 2 M.	3	22·84 *t*	1000	704

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b.	**Duncan**	14,000	405	75½	26½	18,222 B.	Blackwall	Thames S. Co.	1901	1903	1,028,147	7 K.S.	2-1	7	14 K.S.	11–6 K.S.	6 K.S.	4 *12-in.*, 12 *6-in.*, 10 *12-pr.*, 2 *3-pr.*, & M.	4	18·9 *t*	900 2000	750
b.	**Emperor of India**	25,000	580	90	28	29,000	Barrow	Vickers	1913	..	2,020,017	12	..	9–8	..	..	..	10 *13·5-in.*, 12 *6-in.*, 2 *3-in.*, A.A., 4 *3-pr.*	4	21	900	..
a.c.	**Essex**	9,800	440	66	24½	22,000 B.	Pembroke	J. Brown	1901	1903	739,946	4–2 K.S.	2–¾	..	5	5	4 K.S.	14 *6-in.*, 8 *12-pr.*, 3 *3-pr.*, 8 M., 2 l.	2	22·79 *t*	800 1600	537
a.c.	**Euryalus** shd.	12,000	440	69½	26¼	21,318 B.	Barrow	Vickers	1901	1904	782,901	6 K.S.	3–2	2	5 K.S.	6 K.S.	5 K.S.	2 *9·2-in.*, 12 *6-in.*, 12 *12-pr.*, 3 *3-pr.*, 8 M.	2	21·63 *t*	800 1600	755
b.	**Exmouth**	14,000	405	75½	26½	18,346 B.	Birkenh'd	Laird	1901	1903	1,032,409	7 K.S.	2–1	7	14 K.S.	11–6 K.S.	6 K.S.	4 *12-in.*, 12 *6-in.*, 10 *12-pr.*, 2 *3-pr.*, & M.	4	19·0	900 2000	750
b.	**Formidable**	15,000	400	75	26¾	15,000 B.	Portsm'th	Earle	1898	1901	1,022,745	9 H.S.	3–2	2	12 H.S.	12–5	8 K.S.	4 *12-in.*, 12 *6-in.*, 16 *12-pr.*, 2 *3-pr.*, & M.	4	18·13 *t*	900 2000	781
b.	**Glory**	12,950	390	74	26	13,500 B.	Birkenh'd	Laird	1899	1901	841,014	6 H.N.	3–2	6 H.N.	12 H.N.	12–5 H.N.	5 H.N.	4 *12-in.*, 12 *6-in.*, 10 *12-pr.*, 6 *3-pr.*, & M.	4	18·12 *t*	800 1850	700
b.	**Goliath**	12,950	390	74	26	13,500 B.	Chatham	Penn	1898	1900	866,006									18·4 *t*		
a.c.	**Good Hope**	14,100	500	71	26	31,071 B.	Govan	Fairfield	1901	1902	990,759	6 K.S.	3–2	..	5 K.S.	6–5 K.S.	5 K.S.	2 *9·2-in.*, 16 *6-in.*, 12 *12-pr.*, 3 *3-pr.*, 2 M.	2	23·5 *t*	1250 2500	900
a.c.	**Hampshire**	10,850	450	68½	25	21,508 Y. & cyl.	Elswick	Hawthorn	1903	1905	866,527*	6–2 K.S.	2–¾	..	5 K.S.	5–4 N.S.	..	4 *7·5-in.*, 6 *6-in*, 20 *3-pr.*, 2 M.	2	23·47 *t*	800 1600	655
b.	**Hannibal**	14,900	390	75	27½	12,000	Pembroke	Harland	1896	1897	906,799	9 H.S.	4–2½	9	14–9 H.S.	14–6 H.S.	6 H.S.	4 *12-in.*, 12 *6-in.*, 16 *12-pr.*, 4 *3-pr.*, 2 M., 2 l.	5	18·0 *t*	900 2200	757
b.	**Hercules**	20,000	510	85	27	25,700 Y²	Jarrow	Palmer P.T.	1910	1911	1,660,950*	11–3	2½	8	..	11	..	10 *12-in.*, 16 *4-in.*, 4 *3-pr.*, 5 M.	3	21·5 *t*	900	780
b.	**Hibernia**	16,350	425	78	26¾	18,000 B. & W. & cyl.	Devonp'rt	Harland & Wolff	1905	1906	1,444,828*	9 H.S.	2–1	8–7	12 H.S.	12–6 H.S.	7 K.S.	4 *12-in.*, 4 *9·2-in.*, 10 *6-in.*, 12 *12-pr.*, 12 *3-pr.*, & M.	4	19·0	950 2150	825
b.	**Hindustan**					18,521 B. & W. & cyl.	Clydeb'nk	J. Brown	1903	1905	1,454,526*	9 K.S.	2–1	8–7	12 K.S.	12–6 N.S.	7 N.S.			19·01 *t*		
a.c.	**Hogue** shd.	12,000	440	69½	26¼	21,432 B.	Barrow	Vickers	1900	1902	749,809	6 K.S.	3	2 H.S.	5 K.S.	6 K.S.	5 K.S.	2 *9·2-in.*, 12 *6-in.*, 12 *12-pr.*, 3 *3-pr.*, 8 M., 2 l.	2	22·6 *t*	800 1600	755

* Total estimated cost of ship including guns.

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GREAT BRITAIN.—Armoured Ships—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Second-ary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.						£	in.	in.	in.	in	in.	in.			knots.	tons.	
b.	Illustrious .	14,900	390	75	27½	12,000	Chatham	Penn .	1896	1898	894,585	9 H.S.	4–2½	9	14–9 H.S.	14–6 H.S.	6 H.S.	4 *12-in.*, 12 *6-in.*, 16 *12-pr.*, 4 *3-pr.*, 2 M., 2 l.	5	16·5 *t*	900 2200	757
b.	Implacable	15,000	400	75	26¾	15,000 B.	D'port	Laird	1899	1902	989,116	9 K.S.	3–2	2	12 K.S.	12–5 K.S.	6	4 *12-in.*, 12 *6-in.*, 16 *12-pr.*, 2 *3-pr.*, & M.	4	18·2 *t*	900 2000	781
b.	Irresistible						Chatham	Maudslay	1898	1901	1,048,136											
b.c.	Invincible	17,250	530	78½	26	41,000 Y^2	Elswick.	Humphrys P.T.	1907	1909	1,768,995*	7–4 K.C.	..	3	..	7	..	8 *12-in.*, 16 *4-in.*, 5 M. .	5	26	1000	780
b.c.	Inflexible					41,000 Y^2	Clydeb'k	J. Brown . P.T.	1907	1908	1,728,229*											
b.c.	Indomitable					41,000 B. & W.	Govan .	Fairfield . P.T.	1907	1908	1,761,080*											
b.c.	Indefatigable .	18,750	555	80	26½	43,000 B. & W.	Devonp'rt	J. Brown . P.T.	1909	1911	1,536,769*	7–4	..	3	..	7	..	8 *12-in.*, 16 *4-in.*, 4 *3-pr.*, 5 M.	2	25	1000	790
b.	Iron Duke .	25,000	580	90	28	30,000	Portsm'th	Cammell Laird P.T.	1912	1914	2,080,918	12	..	9–8	..	..	..	10 *13·5-in.*, 12 *6-in.*, 2 *3-in.* A.A., 4 *3-pr.*	4	22 *t*	900	..
b.	Jupiter . .	14,900	390	75	27½	12,000	Clydeb'nk	Thomson .	1895	1897	902,011	9 H.S.	4–2½	9	14–9 H.S.	14–6 H.S.	6 K.S.	4 *12-in.*, 12 *6-in.*, 16 *12-pr.*, 4 *3-pr.*, 2 M., 2 l.	5	18·4 *t*	900 2200	757
a.c.	Kent . . .	9800	440	66	24½	21,000 B.	Portsm'th	Hawthorn	1901	1903	700,283	4–2 K.S.	2–¾	..	5 K.S.	5–4 N.S.	4 K.S.	14 *6-in.*, 8 *12-pr.*, 3 *3-pr.*, 8 M., 2 l.	2	21·7 *t*	800 1600	537
b.	King Edward VII.	16,350	425	78	26¾	18,138 B. & W. & cyl.	Devonp'rt	Harland .	1903	1905	1,473,245*	9 K.S.	2–1	8–7 K.S.	12 K.S.	12–6 N.S.	7	4 *12-in.*, 4 *9·2-in.*, 10 *6-in.*, 12 *12-pr.*, 12 *3-pr.*, M.	4	19·04 *t*	950 1200	825
b.	King George V. .	23,000	555	89	27½	28,005 B. & W.	Portsm'th	Parsons . P.T.	1911	1912	1,965,413*	12–6	..	9	..	10	..	10 *13·5-in.*, 16 *4-in.*, 4 *3-pr.*	3	22 *t*	900	900
a.c.	King Alfred	14 100	500	71	26	30,893	Barrow .	Vickers	1901	1903	978,125	6-5-4 K.S.	2½–1	..	5 K.S.	6–5 K.S.	5 K.S.	2 *9·2-in.*, 16 *6-in.*, 12 *12-pr.*, 3 *3-pr.*, 2 l.	2	23·46 *t*	1250 2500	900
a.c.	Leviathan .					31,203 B.	Clydeb'nk	J. Brown			1,012,959									23·28 *t*		

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a.c.	**Lancaster** .	9800	440	66	24½	22,000 B.	Elswick .	Hawthorn	1902	1904	732,858	4-2 K.S.	2-⅜		5 K.S.	5-4 N.S.	4 K.S.	14 *6-in.*, 8 *12-pr.*, 3 *3-pr.*, 9 M.	2	24·01 t	800 1600	587
b.c.	**Lion** . .	26,350	660	88½	28	75,685 Y²	Devonport	Vickers . P.T.	1910	1912	2,086,458*	9	..	6	..	9	..	8 *13·5-in.*, 16 *4-in.*, 4 *3-pr.*, 5 M.	2	28·5 t	3000	980
b.	**London** .	15,000	400	75	26½	15,000 B.	Portsm'th	Earle .	1899	1902	1,036,393	9 K.S.	3-2	2	12 K.S.	12-5 K.S.	6	4 *12-in.*, 12 *6-in.*, 16 *12-pr.*, 2 *3-pr.*, & M.	4	18·1 t	900 2000	781
b.	**Lord Nelson** .	16,500	410	79½	27	16,750 B. & W	Jarrow .	Palmer .	1906	1908	1,654,098*	12-6 K.C.		8	8	12	..	4 *12-in.*.10 *9·2-in.*,24 *12-pr.*, 2 *3-pr.*, 5 M.	5	18·9 t	900 2200	747
b.	**Malaya¶** .	27,500	600	90½	28¾	..	Walker .	Wallsend .	Bldg.	..	..	13	..	..	..	10	..	8 *15-in.*, 12 *6-in.* . .	..	25	Oil	..
b.	**Magnificent** .	14,900	390	75	27½	12,000	Chatham	Penn .	1894	1895	908,789									17·6 t		
b.	**Majestic** .	14,900	390	75	27½	12,000	Portsm'th	Barrow .	1895	1895	916,382	9 H.S.	4-2½	9	14-9 H.S.	14-6 H.S.	6 K.S.	4 *12-in.*, 12 *6-in.*, 16 *12-pr.*, 4 *3-pr.*, 2 M., 2 l.	5	17·9 t	900 2200	757
b.	**Mars** .	14,900	390	75	27½	12,000	Birkenh'd	Laird .	1896	1897	902,402									17·7 t		
b.	**Marlborough** .	25,000	580	90	28	29,000	Devonport	Hawthorn P.T.	1912	1914	2,043,437	12	..	9-8	..	..	..	10 *13·5-in.*,12 *6-in.*, 2 *3-in.* A.A., 4 *3-pr.*	4	22 t	900	..
a.c.	**Minotaur** .	14,600	490	74½	26	27,856 Y²	Devonp'rt	Harland & Wolff	1906	1908	1,438,065*	6-4	1-½	6	..	8	7	4 *9·2-in.*, 10 *7·5-in.*, 16 *12-pr.*, 5 M.	5	23·01 t	1000	850
b.	**Monarch** .	22,500	545	88½	27½	28,555 Y²	Elswick .	Hawthorn. P. T.	1911	1912	1,886,912*	12	..	9	..	10	..	10 *13·5-in.*, 16 *4-in.*, 4 *3-pr.*	3	21·88 t	900 2700	800
a.c.	**Monmouth** .	9800	440	66	24½	22,000 B.	Glasgow	London & Glasgow	1901	1903	979,591	4-2 K.S.	2-¾	4 K.S.	5 K.S.	5-4 N.S.	4 K.S.	14 *6-in.*, 8 *12-pr.*, 3 *3-pr.*, 8 M., 2 l.	2	22·58 t	800 1600	537
a.c.	**Natal** .	13,550	480	73½	27	23,592 Y² & Cyl.	Barrow .	Shipbg.Co Vickers .	1905	1907	1,218,244*	6-4-3 K.S.	¾-1	6	6	6	6	6 *9·2-in.*, 4 *7·5-in.*, 24 *3-pr.*, 2 M.	3	23·33 t	1000	704
b.	**Neptune** .	19,900	510	85	27	27,721 Y²	Portsm'th	Harland & Wolff† P.T.	1909	1911	1,715,258*	11-3	2½	8	..	11	..	10 *12-in.*, 16 *4-in.*, 4 *3-pr.*, 5 M.	3	21·78 t	900	780
b.c.	**New Zealand‡** .	18,800	555	80	26½	46,894 B. & W.	Govan	Fairfield . P.T.	1911	1912	(‡)	..	..	..	..	..	..	8 *12-in.*, 16 *4-in.*, 4 *3-pr.*, 5 M.	2	25	1000	780
b.	**Ocean** .	12,950	390	74	25½	13,500 B.	Devonport	Hawthorn	1898	1900	883,778	6 H.N.	2-1	6	12 H.N.	12-5 H.N.	5 H.N.	4 *12-in.*, 12 *6-in.*, 10 *12-pr.*, 6 *3-pr.*, & M.	4 (4 sub.)	18·74 t	800 1850	700
b.	**Orion** .	22,500	545	88½	27½	29,108 B. & W.	Portsm'th	Wallsend . P. T.	1910	1911	1,918,773*	12	..	9	..	10	..	10 *13·5-in.*, 16 *4-in.*, 4 *3-pr.*, 5 M.	3	21·02 t	900 2700	800

* Estimated cost of ship including guns. † By arrangement with John Brown & Co. ‡ Built at the charge of the New Zealand Government. ¶ Particulars unofficial

GREAT BRITAIN.—Armoured Ships—*continued.*

Class	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Second-ary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.						£	in.	in.	in.	in.	in.	in.			knots.	tons.	
b.	**Prince George** .	14,900	390	75	27½	12,000	Portsm'th	Humphrys	1895	1896	895,504	9 H.S.	4–2½	9	14–9 H.S.	14–6 H.S.	6	4 *12-in.*, 12 *6-in.*, 16 *12-pr.*, 4 *3-pr.*, 2 l.	5	18·3 *t*	900 2400	757
b.	**Prince of Wales**	15,000	400	75	26¾	15,000 B.	Chatham	Greenock Foundry	1902	1904	1,114,079	9 K.S.	2–1	3	12 K.S.	12–6 N.S.	6–2 K.S.	4 *12-in.*, 12 *6-in.*, 16 *12-pr.*, 2 *3-pr.*, & M.	4	18·0	900	781
b.c.	**Princess Royal** .	26,350	660	88½	28	76,510 Y²	Barrow .	Vickers . P.T.	1911	1912	2,092,214*	9	..	6	..	9	..	8 *13·5-in.*, 16 *4-in.*, 4 *3-pr.*, 5 M.	2	28·5 *t*	3000	980
b.c.	**Queen Mary** .	27,000	660	89	28	78,700	Jarrow .	J. Brown . P.T.	1912	..	2,078,491*	9	..	6	..	9	..	8 *13·5-in.*, 16 *4-in.*, 4 *3-pr.*, 5 M.	2	28 *t*	3000	1000
b.	**Queen Elizabeth** ¶	27,500	600	90½	28¾	60,000	Portsm'th	Wallsend . P.T.	1913	..	..	13	..	..	..	10	..	8 *15-in.*, 12 *6-in.*	..	25	Oil	..
b.	**Queen** . .	15,000	400	75	26¾	15,000 B. & W.	Devonport	Harland & Wolff	1902	1904	1,074,999	9 K.S.	2–1	3	12 K.S.	12–6 N.S.	6–2 K.S.	4 *12-in.*, 12 *6-in.*, 18 *12-pr.*, 4 *3-pr.*, & M.	4	18·39 *t*	900	781
b.	**Ramillies** ¶						Dalmuir .	Beard-more, P.T.														
b.	**Resolution** ¶						Jarrow .	Palmer . P.T.														
b.	**Revenge** ¶	25,750	580	..	..	..	Barrow .	Vickers . P.T.	Bldg.	..	..	13	..	..	..	10	..	8 *15-in.*, 12 *6-in.*	..	21	..	..
b.	**Royal Oak** ¶						Devonp'rt	Hawthorn P.T.														
b.	**Royal Sovereign** ¶						Portsm'th	Parsons . P.T.														
a.c.	**Roxburgh** .	10,850	450	68½	25	22,102 D. & cyl.	Glasgow	London & Glasgow Company	1904	1905	862,077*	6–2 K.S.	2–¾	..	4½ K.S.	6 N.S.	6	4 *7·5-in.*, 6 *6-in.*, 20 *3-pr.*, 2 M.	2	23·63 *t*	800 1600	655
b.	**Russell** . .	14,600	405	75½	26½	18,229 B.	Jarrow .	Palmer .	1901	1903	1,037,995	7 K.S.	2–1	7 K.S.	14 K.S.	11–6 K.S.	6 K.S.	4 *12-in.*, 12 *6-in.*, 10 *12-pr.*, 2 *3-pr.*, & M.	4	19·3 *t*	900 2000	750
b.	**St. Vincent** .	19,250	500	84	27	24,500 B. & W.	Portsm'th	Scott's S. . P.T.	1908	1910	1,754,615*	10	¾–1¾	8	..	9	..	10 *12-in.*, 18 *4-in.*, 4 *3-pr.*, 5 M.	3	21·9 *t*	900	780
a.c.	**Shannon** .	14,600	490	75½	25	28,553 Y²	Chatham	Humphrys	1906	1908	1,423,410*	6–4	1–½	3	..	8	..	4 *9·2-in.*, 10 *7·5-in.*, 16 *12-pr.*, 5 M.	5	22·49 *t*	950	850
a.c.	**Suffolk** . .	9800	440	66	24½	22,000 Nic.	Portsm'th	Humphrys	1903	1904	722,681	4–2 K.S.	2–¾	..	5 K.S.	5–4 N.S.	4 K.S.	14 *6-in.*, 8 *12-pr.*, 3 *3-pr.*, 9 M.	2	24·7 *t*	800 1600	537

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a.c.	**Sutlej**	shd.	12,000	440	69½	26¼	**21,281** **B.**	**Clydeb'nk**	**J. Brown**	**1899**	**1902**	755,690	6 K.S.	3–2	..	5 K.S.	6 K.S.	5 K.S.	2 *9·2-in.*, 12 *6-in.*, 12 *12-pr.*, 3 *3-pr.*, 8 M., 2 l.	2	21·77 *t*	800 1600	755
b.	**Superb**		18,600	490	82	27	23,000 B. & W.	Elswick	Wallsend P. T.	1907	1909	1,660,446*	11-8-4 K.C.	..	8	..	11 K.C.	..	10 *12-in.*, 16 *4-in.* B.L., 4 *3-pr.*, 5 M.	3	21·6 *t*	900	870
b.	**Temeraire**						23,000 Y²	Devonp'rt	Hawthorn P. T.	1907	1909	1,748,955*									22·07 *t*		
b.c.	**Tiger ¶**		28,000	660	90½	28¼	100,000	Clydeb'nk	J. Brown C. T.	1913	..	..	..	..	..	..	..	..	8 *13·5-in.*, 12 *6-in.*	..	28	3000	..
b.	**Swiftsure**		11,800	436	71	24½	12,500	Elswick	Humphrys, Tennant	1903	1904	845,036	7	3	7	..	10	7 K.S.	4 *10-in.*, 14 *7·5 in.*, 14 *14-pr.*, 4 *6-pr.*, & M.	2	19·6 *t*	800 2000	700
b.	**Triumph**							Barrow	Vickers	1903	1904	845,479											
b.	**Thunderer**		22,500	545	88½	27½	27,604 B. & W.	Blackwall	Thames Ironworks P. T.	1911	1912	1,889,920*	12	..	9	..	10	..	10 *13·5-in.*, 16 *4-in.*, 4 *3-pr.*, 5 M.	3	21	900 2700	800
b.	**Valiant ¶**		27,500	600	90½	28¾	60,000	Govan	Fairfield P.T.	Bldg.	..	..	13	..	..	..	10	..	8 *15-in.*, 12 *6-in.*	..	25	Oil	..
b.	**Vanguard**		19,250	500	84	27	24,500 B. & W.	Barrow	Vickers P. T.	1909	1910	1,607,781*	10	¾–1¾	8	..	9	..	10 *12-in.*, 18 *4-in.*, 4 *3-pr.*, 5 M.	3	22·1 *t*	900	724
b.	**Venerable**		15,000	400	75	26¾	15,345 B.	Chatham	Maudslay	1899	1902	1,092,753	7 K.S.	4–2½	3	14 K.S.	11–6 K.S.	6–2	4 *12-in.*, 12 *6-in.*, 16 *12-pr.*, 2 *3-pr.*, & M.	4	18·3 *t*	900 2000	781
b.	**Vengeance**		12,950	390	74	26	13,500 B.	Barrow	Vickers	1899	1901	836,417	6 K.S.	2–1	6	12 K.S.	12–6 K.S.	5 K.S.	4 *12-in.*, 12 *6-in.*, 10 *12-pr.*, 6 *3-pr.*, & M.	4	18·5 *t*	800 1850	750
b.	**Victorious**		14,900	390	75	27½	12,000	Chatham	Hawthorn	1895	1897	885,212	9 H.S.	3–2½	9	14–9 H.S.	14–6 H.S.	6	4 *12-in.*, 12 *6-in.*, 16 *12-pr.*, 4 *3-pr.*, 8 M., 2 l.	5 (4 sub.)	18·7 *t*	900 2200	757
a.c.	**Warrior**		13,550	480	73½	27	23,641 Y² & cyl.	Pembroke	Wallsend	1905	1907	1,186,395*	6–4–3 K.S.	¾–1	6	6	6	6	6 *9·2-in.*, 4 *7·5-in.*, 24 *3-pr.*, 2 M.	3	22·9 *t*	1000	704
b.	**Warspite ¶**		27,500	600	90½	28¾	60,000	Devonp'rt	Hawthorn P.T.	1913	..	..	13	..	..	..	10	..	8 *15-in.*, 12 *6-in.*	..	25	Oil	..
b.	**Zealandia** (*ex* New Zealand.)		16,350	425	78	26¾	18,440 Nic. & Cyl.	Portsm'th	Humphrys	1904	1905	1,424,375*	9 K.S.	2–1	8–7 K.S.	12 K.S.	12–6 K.S.	7	4 *12-in.*, 4 *9·2-in.*, 10 *6-in.*, 12 *12-pr.*, 12 *3-pr.*, M.	4	18·59 *t*	950 2150	825
	4 Armoured ships‡.						Details not published.			Pro.													

* Total estimated cost of ship, including guns.

‡ Programme 1914–15: one Queen Elizabeth (Portsmouth), one Royal Sovereign (Devonport), two Royal Sovereigns (contract).

¶ Particulars unofficial.

GREAT BRITAIN.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt. / Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.						£	in.	in.			knots.	tons.	
P. 3rd cl. Cr.	**Active** . .	3440	385	41½	13¾	18,000 Y.	Pembroke	Hawthorn. P.T.	1911	1911	272,977*	..	..	10 *4-in.* B.L., 4 *3-pr.*, and M.	2	26·0 *t*	350	320
„ „	**Amphion** . .	3440	385	41½	13¾	18,800 Y.	Pembroke	Parsons . P.T.	1911	1913	277,781*	..	..	10 *4-in.* B.L., 4 *3-pr.*, and M.	2	25·5	350	320
Scout. .	**Adventure** .	2670	374	38¼	13½	15,850 Y mod.	Elswick .	Hawthorn.	1904	1905	270,263	2	¾	9 *4-in.* . . .	2	25·42 *t*	227	268
„ „	**Amethyst** . .	3000	360	40	14½	14,200 Y mod.	Elswick .	Parsons . P.T.	1903	1905	228,426	..	..	12 *4-in.*, 8 *3-pr.*, M. .	2	23·42 *t*	300	296
P. 1st cl. Cr.	**Amphitrite** shd.	11,000	435	69	25¼	18,000 B.	Barrow .	Vickers .	1898	1900	552,795	4	3-6 H. S.	16 *6-in.*, 12 *12-pr.*, 3 *3-pr.*, 2 M.	2 (1 sub.)	20·75	1000	677
„ „	**Argonaut** . shd.	11,000	435	69	25¼	18,000 B.	Govan .	Fairfield .	1898	1900	545,756	4	3-6 H. S.	16 *6-in.*, 12 *12-pr.*, 3 *3-pr.*, 2 M.	2 (1 sub.)	20·75	1000	677
L. Cr.	**Arethusa**† .	3,750	410	39	13½	30,000	atham	Fairfield .	1913	..	..	3	..	2 *6-in.*, 8 *4-in.* . .	2	29	Oil	..
„ „	**Aurora**† .						Devonprt	Parsons .	1913									
P. 3rd cl Cr.	**Astræa** . shd.	4360	320	49½	19	9112	Devonp'rt	Devonport	1893	1894	254,217	2-1	3	2 *6-in.*, 8 *4·7-in.*, 8 *6-pr.*, 1 *3-pr.*, M.	3	19·75	400	312
Scout . .	**Attentive** . .	2670	374	38¼	13½	16,212 Y.	Elswick .	Hawthorn .	1904	1906	270,263	2	¾	9 *4-in.* . . .	2	25·88 *t*	227	268
P. 3rd cl. Cr	**Bellona** . .	3360	385	41½	13¾	18,000 Y.	Pembroke	Fairfield . P.T.	1909	1910	283,038*	½-1	..	6 *4-in.* B.L., 4 *3-pr.*, and M.	2	25·9 *t*	450	263
P. 2nd cl.	**Birmingham** .	5440	430	49·10	15·10	26,500	Elswick .	Hawthorn.	1912	1914	353,437*	..	..	9 *6-in.*, 4 *3-pr.* . .	2	25·5	650	..
P. 3rd cl. Cr.	**Blanche** . .	3350	385	41½	13½	18,542 Y.	Pembroke	Hawthorn. P.T.	1909	1910	288,482*	..	..	10 *4-in.* B.L., 4 *3-pr.*, and M.	2	25·67 *t*	350	292

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,, ,,	**Blonde** . .	3350	385	41½	13½	18,770 Y.	Pembroke	Cammell Laird P.T.	1910	1911	267,754*	..	..	10 *4-in.* B.L., 4 *3-pr.*, and M.	2	25·43 *t*	350	292
,, ,,	**Boadicea** . .	3300	385	41	13½	18,000 Y.	Pembroke	J. Brown . P.T.	1908	1909	330,631*	½–1	..	6 *4-in.* B.L., 4 *3-pr.*, and M.	2	25·75 *t*	450	263
P. 2nd cl. Cr.	**Bristol** . .	4800	430	47	15¼	24,529 Y.	Clydeb'nk	J. Brown . C.T.	1910	1910	364,953*	2–¾	..	2 *6-in.*, 10 *4-in.* B.L., 4 M.	2	26·84	650	376
L. Cr. .	**Calliope**† .						Chath'm	Parsons .										
,, .	**Caroline**† .						Birken-head	Cammell Laird										
,, .	**Carysfort**† .						Pembroke	Hawthorn.										
,, .	**Champion**†						Newcastle (Hawth'rn)	Hawthorn.										
,, .	**Cleopatra**† .	3800	420	39	13½	30,000	Devonport	Cammell Laird	Bldg.	..	..	3	..	2 *6-in.*, 8 *4-in.* . .	..	29	Oil	..
,, .	**Comus**† .						Newcastle (Swan Hunter)	Wallsend Engn'g Co.										
,, .	**Conquest**† .						Chatham	Scotts' .										
,, .	**Cordelia**† .						Pembroke	Hawthorn.	1914	..	..	3	..	2 *6-in.*, 8 *4-in.* . .	..	29	Oil	..
P. 2nd cl. Cr.	**Challenger** .	5880	355	56	21¼	12,500 B.&W	Chatham	Wallsend Eng'ng Co.	1902	1904	360,194	3–2	..	11 *6-in.*, 8 *12-pr.*, 1 *3-pr.*, 2 M.	2	21·0	500	454
P. 3rd cl. Cr.	**Charybdis** shd.	4360	320	49½	19	9000	Sheerness	Earle .	1893	1895	241,029	2–1	2	2 *6-in.*, 8 *4·7-in.*, 8 *6-pr.*, 1 *3-pr.*, M.	3	19·5	400	312
P. 2nd cl. Cr.	**Chatham** . .	5400	430	49¾	15¾	25,901 Y.	Chatham.	Thames Ironworks P.T.	1911	1912	349,358*	3	..	8 *6-in.*, 4 *3-pr.*, 4 M., 1 l.	2	25·5	650	400
,, ,,	**Crescent** . shd.	7700	360	60	23¾	12,000	Portsm'th	Penn .	1892	1894	392,453	5–1	6	1 *9·2-in.*, 12 *6-in.*, 12 *6-pr.*, 5 *3-pr.*, M.	2 (1 sub.)	19·7	850	560
,, ,,	**Dartmouth** .	5250	430	48½	15½	23,467 Y.	Barrow .	Vickers . P.T.	1911	1911	329,406*	2–¾	..	8 *6-in.*, 4 *3-pr.*, 4 M. .	2	25·9 *t*	650	390
P. 3rd cl. Cr.	**Diamond** . .	3000	360	40	14½	10,066 N. L.	Birkenh'd	Laird .	1904	1905	231,010	..	..	12 *4-in.*, 8 *3-pr.*, M.	2	22·17 *t*	300	296

* Total estimated cost of ship including guns. † Particulars unofficial.

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GREAT BRITAIN.—Cruising Ships, &c.—*continued.*

Class.	NAME.		Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
			tons.	ft.	ft.	ft.						£	in.	in.			knots.	tons.	
P. 2nd cl. Cr.	**Diana**	shd.	5600	350	54	21	9600	Govan	Fairfield	1895	1898	253,009				3	19·5	550	449
" "	**Dido**	shd.	5600	350	54	21	9600	Glasgow	London and Glasgow Co.	1896	1898	254,190	2½	3	11 *6-in.*, 8 *12-pr.*, 1 *3-pr.*, 5 M., 1 l.	3 (2 sub.)	19·5	550	449
" "	**Doris**	shd.	5600	350	54	21	9600	Barrow	Vickers	1896	1898	256,306							
P. 2nd cl. Cr.	**Dublin**		5400	430	49·10	15¾	25,000 Y.	Dalmuir	Beardmore P. T.	1912	1913	337,565*	3	..	8 *6-in.*, 1 *12-pr.*, 4 *3-pr.*, 4 M., 1 l.	2	25·5	650	400
" "	**Eclipse**	shd.	5600	350	53	20¼	9600	Portsm'th	Portsm'th	1894	1897	276,313	1½–3	3	5 *6-in.*, 6 *4·7in.*, 8 *12-pr.*, 1 *3-pr.*, 5 M., 1 l.	3	19·5	550	456
" "	**Edgar**		7350	360	60	23¾	12,000	Devonp'rt	Fairfield	1890	1893	410,980	5–1	6	2 *9·2-in.*, 10 *6-in.*, 12 *6-pr.*, 5 *3-pr.*, M.	4	20·5	850	544
" "	**Endymion**		7350	360	60	23¾	12,000	Hull	Earle	1891	1894	375,350	5–1	6	2 *9·2-in.*, 10 *6-in.*, 12 *6-pr.*, 5 *3-pr.*, M.	2	20·5	850	544
P. 1st cl. Cr.	**Europa**	shd.	11,000	435	69	26	16,500 B.	Clydeb'nk	Thomson	1897	1899	564,690	4–2½	4½–2	16 *6-in.*, 12 *12-pr.*, 3 *3-pr.*, 2 M.	2	20·5	1000	357
P. 2nd cl. Cr.	**Falmouth**		5250	430	48½	15½	23,467 Y.	Dalmuir	Beardmore P. T.	1910	1911	337,473*	2–¾	..	8 *6-in.*, 4 *3-pr.*, 4 M.	2	25·5	650	390
P. 3rd cl. Cr.	**Fearless**		3440	385	41·6	13·9	18,900	Pembroke	Beardmore P.T.	1912	1913	269,855	..	..	10 *4-in.*, 4 *3-pr.*	..	25·5	350	320
" "	**Fox**	shd.	4360	320	49½	19	9000	Portsm'th	Portsm'th	1893	1895	245,571	2–1	2	2 *6-in.*, 8 *4·7-in.*, 1 *12-pr.*, 13 *6-pr.*, *3-pr.*, M.	3	19·5	400	312

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Scout . .	Foresight .		2850	360	39	14	14,277 T.	Govan .	Fairfield .	1904	1905	285,672	1½–⅝	..	9 *4-in.* . . .	.	2	25·12 *t*	250	268
,, . .	Forward .						15,018 T.					285,326						25·15 *t*		
L. Cr. .	Galatea† .	.	3750	410	39	13½	30,000	Dalmuir .	Beardmore	1914	..	..	3	..	2 *6-in.*, 8 *4-in.* .	.	2	29	Oil	..
P. 2nd cl.Cr.	Gibraltar .	shd.	7700	360	60	23¾	12,000	Glasgow .	Napier	1892	1894	373,236	5–1	6	2 *9·2-in.*, 10 *6-in.*, *6-pr.*, 5 *3-pr.*, M.	12	2	19·7	850	544
,, ,,	Glasgow .	.	4800	430	47	15¼	22,472 *t*	Govan .	Fairfield P. T.	1909	1910	354,884*	2–¾	..	2 *6-in.*, 10 *4-in.*, *12-pr.*, 4 *3-pr.*	1	2	25·8 *t*	650	376
,, ,,	Gloucester	.					23,757 *t*	Dalmuir	Beardmore P. T.			353,856*						26·29 *t*		
,, ,,	Grafton .	.	7350	360	60	23¾	12,000	Blackwall	Humphrys	1892	1894	372,890	..	6	2 *9·2-in.*, 10 *6-in.*, *6-pr.*, 5 *3-pr.*, M.	12	2	20·0	850	560
,, ,,	Hawke .	.	7350	360	60	23¾	12,000	Chatham.	Fairfield .	1891	1893	400,702	5–1	6	2 *9·2-in.*, 10 *6-in.*, *6-pr.*, 5 *3-pr.*, M.	12	2	20·0	850	544
,, ,,	Hermes .	shd.	5600	350	54	20½	10,000 B.&W.	Govan .	Fairfield .	1898	1900 1902	281,776								
,, ,,	Highflyer	shd.	5600	350	54	20½	10,000 B.	Govan .	Fairfield .	1898	1900	280,182	1½–3	3	11 *6-in.*, 8 *12-pr.*, *3-pr.*, 2 M.	1	2	20·0	600	456
,, ,,	Hyacinth .	shd.	5600	350	54	20½	10,000 B.	Glasgow .	London and Glasgow Co.	1898	1901	288,595								
P. 3rd cl. Cr.	Hermione	shd.	4360	320	49½	19	9000	Devonp'rt	Thomson .	1893	1895	223,324	2–1	2	2 *6-in.*, 8 *4·7-in.*, *6-pr.*, 1 *3-pr.*, M.	8	3	19·5	400	312
T. G. B. .	Hussar .	.	1070	250	30½	9	3500	Devonp'rt	Hawthorn.	1894	1895	72,313	..	2	1 *4·7-in.*, 2 *6-pr.*, M.	.	5	19·0	100	120
L. Cr. .	Inconstant †	.	3750	410	39	13½	30,000	Dalmuir .	Beardmore	Bldg.	..	..	3	..	2 *6-in.*, 8 *4-in.*		2	29	Oil	..
P. 2nd cl. Cr.	Isis .	. shd.	5600	350	54	21	9600	Glasgow .	London and Glasgow Co.	1896	1898	253,733	2½	3	11 *6-in.*, 8 *12-pr.*, *3-pr.*, 5 M., 1 l.	1	3 (2 sub.)	19·5	550	449
,, ,,	Juno	. shd.	5600	350	54	21	9600	Barrow .	Vickers .	1895	1898	256,106								

* Total estimated cost of ship, including guns.

† Particulars unofficial.

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GREAT BRITAIN.—Cruising Ships, &c.—*continued.*

Class.	NAME		Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Makers of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt. / Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
			tons.	ft.	ft.	ft.						£	in.	in.			knots.	tons.	
P. 2nd cl. Cr.	Liverpool .	.	4800	430	47	$15\frac{1}{4}$	24,614 Y.	Barrow .	Vickers . P.T.	1909	1910	344,871*	2–$\frac{3}{4}$	..	2 *6-in.*, 10 *4-in.* B.L., 4 *3-pr.*	2	26·17 *t*	650	376
„ „	Lowestoft .	.	5440	430	49	15	22,000	Chatham.	Fairfield .	1913	1914	375,162	..	..	9 *6-in.*, 4 *3-pr.*	2	25·5	650	..
„ „	Minerva .	shd.	5600	350	53	$20\frac{1}{2}$	9600	Chatham.	Chatham .	1895	1897	275,331	$1\frac{1}{2}$-3	3	11 *6-in.*, 8 *12-pr.*, 1 *3-pr.*, 5 M., 1 l.	3 (2 sub.)	19·5	550	416
„ „	Newcastle	.	4800	430	47	$15\frac{1}{4}$	24,669 Y.	Elswick .	Wallsend Engineering Co. P.T.	1909	1910	352.610*	2–$\frac{3}{4}$	..	2 *6-in.*, 10 *4-in.* B.L., 4 *3-pr.*	2	26·26 *t*	650	376
„ „	Nottingham	.	5440	430	49	15	22,000	Pembroke	Hawthorn	1912	1914	379,013*	..	..	9 *6-in.*, 4 *3-pr.* .	2	25·5	650	..
P. Scout .	Pathfinder		2940	370	$38\frac{3}{4}$	14	17,176 L.N.	Birknhd.	Laird .	1904	1905	273,147	$\frac{1}{2}$–$\frac{5}{8}$	..	9 *4-in.* . . .	2	25·34 *t*	300	268
„ .	Patrol .						16,460					273,523					25·06 *t*		
P. 3rd cl. Cr.	Pegasus .	.	2135	300	$36\frac{1}{2}$	17	7000 R.	Jarrow .	Palmer .	1897	1899	134,919							
„ „	Pelorus .	.	2135	300	$36\frac{1}{2}$	17	7000 Nor.	Sheerness	Thomson .	1896	1897	154,315							
„ „	Psyche .	.	2200	305	$36\frac{3}{4}$	$17\frac{1}{2}$	7000 T.	Devonp'rt	Devonport	1898	1900	156,890	2	·22	8 *4-in.*, 8 *3-pr.*, M. .	2	20·0	250 / 517	234
„ „	Proserpine	.	2135	300	$36\frac{1}{2}$	17	7000 T.	Sheerness	Devonport	1896	1899	165,020							
„ „	Pyramus	.	2135	300	$36\frac{1}{2}$	$13\frac{1}{2}$	7000 R.	Jarrow .	Palmer .	1897	1900	135,249							
L. Cr. .	Penelope †	.	3750	410	39	$13\frac{1}{2}$	30,000	Barrow .	Vickers .	Bldg.	..	..	3 / —	..	2 *6-in.*, 8 *4-in.* .	2	29	Oil	..

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L. Cr.	**Phaeton** †	3750	410	39	13½	30,000	Barrow	Vickers	Bldg.	..	..	3	..	2 *6-in.*, 8 *4-in.*	2	29	Oil	..
P. 3rd cl. Cr.	**Philomel**	2575	265	41	15½	7500	Devonp'rt	Earle	1890	1892	163,699	2–1	2	8 *4·7-in.*, 8 *3-pr.*, M.	2	19·0	300	217
P. 2nd cl. Cr.	**Royal Arthur** shd.	7700	360	60	27¾	12,000	Portsm'th	Maudslay	1891	1893	412,033	5–1	6	1 *9·2-in.*, 12 *6-in.*, 12 *6-pr.*, 5 *3-pr.*, M.	2 (2 sub.)	19·7	850	567
L. Cr.	Royalist †	3400	410	39	12½	30,000	Dalmuir	Beardmore	Bldg.	..	..	3	..	2 *6-in.*, 8 *4-in.*	2	29	Oil	..
P. 3rd cl. Cr.	**Sapphire**	3000	360	40	*14½	10,200	Jarrow	Palmer	1904	1905	226,277	..	..	12 *4-in.*, 8 *3-pr.*, M.	2	22·45 *t*	300	296
„ „	**Sappho**	3400	300	43	16½	9861	Poplar	Penn	1891	1893	176,813	2–1	2	2 *6-in.*, 6 *4·7-in.*, 8 *6-pr.*, 1 *3-pr.*, M.	4	20·47	400	273
P. Scout	Sentinel	2895	360	40	14½	17,488 Nor.	Barrow	Vickers	1904	1905	276,344	1½–⅝	..	9 *4-in.*	2	25·07 *t*	205	268
P. 3rd cl. Cr.	**Sirius** shd.	3600	300	43¾	17½	V.E. 9000	Elswick	Maudslay	1890	1892	190,991	2–1	2	2 *6-in.*, 8 *4·7-in.*, 8 *6-pr.*, 1 *3-pr.*, M.	4	19·75	400	273
P. Scout	**Skirmisher**	2895	360	40	14¼	17,053 Nor.	Barrow	Vickers	1905	1905	276,579	1½–⅝	..	9 *4-in.*	2	25·19	205	268
P. 2nd cl. Cr.	Southampton	5400	430	49·10	15¾	25,000 Y.	Clydeb'nk	J. Brown C.T.	1912	1913	336,469*	3	..	8 *6-in.*, 4 *3-pr.*, 4 M., 1 l.	2	25·5	650	400
T. B. D.	Swift.	1800	345	34⅙	10½	30,000 L.Y.	Birkenh'd	Cammell Laird	1907	1909	241,595*	..	..	4 *4-in.*	..	35·25	180 Oil	150
P. 2nd cl. Cr.	**Talbot** shd.	5600	350	53½	21	9600	Devonpr't	Devonport	1895	1897	263,699	1½–3	3	11 *6-in.*, 8 *12-pr.*, 1 *3-pr.*, 5 M., 1 l.	3 (2 sub.)	19·5	550	412
P. 1st cl. Cr.	**Terrible** shd.	14,200	500	71	27	25,000 B.	Glasgow	Thomson	1895	1898	708,619	3–6	6	2 *9·2-in.*, 16 *6-in*, 14 *12-pr.*, 12 *3-pr.*, 9 M.	4	22·4	1500 / 3000	840
P. 2nd cl. Cr.	Theseus	7350	360	60	23¾	12,000	Blackwall	Maudslay	1892	1894	370,359	5–1	6	2 *9·2-in.*, 10 *6-in.*, 12 *6-pr.*, 5 *3-pr.*, M.	2 (2 sub.)	20·0	850	544
P. 3rd cl. Cr.	Topaze	3000	360	40	14½	9860 L.N.	Birkenh'd	Laird	1903	1905	242,444	..	..	12 *4-in.*, 8 *3-pr.*, M.	2	22·1 *t*	300	296

* Total estimated cost of ship, including guns.

† Particulars unofficial.

GREAT BRITAIN.—Cruising Ships, &c.—*continued.*

Class	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.						£	in.	in.			knots.	tons.	
L. Cr.	**Undaunted** †	3750	410	39	13½	30,000	Govan	Fairfield	1914	..	..	..	3	2 *6-in.*, 8 *4-in.*	2	29	..	..
P. 2nd cl. Cr.	**Venus** shd.	5600	350	54	21½	9600	Govan	**Fairfield**	1895	1898	254,184	2½	3	11 *6-in.*, 8 *12-pr.*, 1 *3-pr.*, 5 M., 1 l.	3 (2 sub.)	19·5	550	449
" "	**Vindictive**	5750	320	54	20½	10,000 B.	Chatham	Chatham	1897	1897	282,879	1–2 N.S.	3	10 *6-in.*, 8 *12-pr.*, 1 *3-pr.*, 5 M., 1 l.	2	20·1	500	429
" "	**Weymouth**	5250	430	48½	15½	22,000 Y.	Elswick	Parsons P. T.	1910	1911	337,738*	2¾	..	8 *6-in.*, 4 *3-pr.*, 4 M.	2	25·5 *t*	650	390
" "	**Yarmouth**						Glasgow	London & Glas. Co. C. T.	1911	1912	353,238*							
..	4 light cruisers	1914–15 Programme. Details not published.					1 Pembroke, 3 Contract.	..	..	..	..	..	..	..	..	..	..	..

* Total cost, including guns. † Particulars unofficial.

River Gunboats.—Robin, Nightingale, **Snipe, Sandpiper** (1897), 85 tons; **Woodcock, Woodlark** (1898), 150 tons, 2 6-prs., 4 Maxims; **Kinsha** (1901), 616 tons, **Teal, Moorhen** (1902), 180 tons, 2 6-prs., 13 knots; **Widgeon** (1905), 195 tons. *Despatch Vessels.*—**Alacrity** (1885), 1,700 and 1,650 tons. *Torpedo Gunboats* (some serving as mine sweepers).—Circe, Gossamer, **Dryad, Halcyon, Harrier, Jason**, Leda, Niger, Seagull, **Skipjack**, Spanker, Speedwell, and Speedy.

The following vessels have been struck off the effective list, but the armaments have not in every case been removed:—*Cruisers:* Brilliant, Furious, Ariadne, Diadem, and Spartiate. The following small craft have been placed on a "Special Service List" of "unprotected ships": Sphinx, Lapwing, Redbreast (East Indies), Ringdove (Fishery P.), **Pomone** (special service), **Dwarf** (W. C. Africa), Shearwater (British Columbia), Bramble, Britomart, Thistle, Clio, and Cadmus (China).

The following vessels are employed on special service:—**Assistance** and **Cyclops**, fleet repair ships; **Woolwich, Blake, Blenheim, Hecla, Leander, St. George,** and **Tyne**, torpedo depot ships; **Maidstone, Adamant, Alecto, Arrogant, Bonaventure, Forth, Mercury, Pactolus, Thames, Vulcan, Dolphin, Onyx, Antelope, Hebe, Sharpshooter,** and **Hazard**, submarine depôt ships; **Aquarius**, distilling vessel; **Iphigenia, Apollo, Naiad, Intrepid, Andromache, Latona,** and **Thetis**, mine-laying vessels; and **Seaflower, Seamew, Sparrow, Spider,** and **Driver**, steam-trawlers for mine-sweeping duties, purchased April, 1909.

One destroyer depôt ship, one fleet repair ship, and one hospital ship, the **Mediator**, purchased 1913.

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Defence Forces of the Dominions.

AUSTRALIA.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt. / Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.						£	in.	in.			knots.	tons.	
b.c. . .	Australia .	. 18,800	555	80	26½	48,000	Clyde-bank	J. Brown . P.T.	1911	1913	..	..	..	8 *12-in.*, 16 *4-in.*, 5 M.	2	26·0 t	1000	790
P. 2nd cl. Cr.	Melbourne .	5400	430	49½	15¾	25,500	Birken-head	Cammell Laird	1912	1913	..	..	..	8 *6-in.*, 4 *3-pr.*, 4 M., 1 l.	2	25·5	..	..
„ „	Sydney .						Glasgow	London & Glasgow Co.	1912	1913								
„ „	Brisbane .						Sydney	..	Bldg.	..								
„ „	Encounter .	5880	355	56	20¼	12,500 Durr	Devonp'rt	Devonport Dockyard .	1903	1906	370,275	3-2	..	11 *6-in.*, 9 *12-pr.*, 1 *3-pr.*, 2 M.	2	20·75	600	454
L. Cr. .	Pioneer .	. 2200	305	36¾	13½	7000 T.	Chatham.	Fairfield .	1899	1900	148,894	2	·22	8 *4-in.*, 11 *3-pr.*, M. .	2	20·0	250 517	234
							CANADA.											
P. 1st cl. Cr.	Niobe .	. 11,000	435	69	26	16,500	Barrow .	Vickers .	1897	1899	..	..	..	16 *6-in.*, 12 *12-pr.*, 3 *3-pr.*, 2 M.	2	20·5	1000	600
P. 2nd cl. Cr.	Rainbow . shd.	3600	300	43¾	17½	9000	Jarrow .	Palmer .	1891	1893	..	..	..	2 *6-in.*, 6 *4·7-in.*, 8 *6-pr.*, 1 *3-pr.*, 4 M., 1 l.	4	19·7	400	273

Royal Naval Reserved Merchant Cruisers.

—	Name.	Owners.	Length.	Breadth.	Draught of Water for the Admiralty List.	Gross Tonnage.	Indicated Horse-Power.	Ocean Speed.
			Feet.	Feet.	Feet.	Tons.		Knots.
Ships in receipt of an annual subvention and permitted to fly the blue ensign.	Mauretania . . .	Cunard Co. . . .	785	88	33·6	31,938	68,000	26·6* t
	Lusitania	„ . . .	785	88	33·6	31,550	68,000	26·6* t

* Speed of best day's run, 1910.

In addition to the above, the Cunard Company holds all vessels for the time being the property of the Company at the disposal of His Majesty's Government for hire or purchase.

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ARGENTINE REPUBLIC.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position. Heavy Guns.	Secondary.	Armament. Guns.	Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
a.c.	Garibaldi . .	6732	328	59¾	24	13,384	Sestri Ponente	1895	1896	752,000	6–3 H.S.	1½	6 H.S.	6 H.S.	6 H.S.	6 H.S.	2 *10-in.*, 10 *6-in.*, 6 *4·7-in.*, 4 *2·2-in.*, 2 M.	2	19·9 *t*	1000	500
a.c.	General Belgrano .	7069	328	59¾	24	13,000	Leghorn .	1897	1899	696,700	6–3 H.S.	1½	6 H.S.	6 H.S.	6 H.S.	6 H.S.	2 *10-in.*, 14 *6-in.*, 2 *3-in.*, 4 *2·2-in.*, 2 L., 2 M.	4	20·1 *t*	1000	500
a.c.	General San Martin	6773	328	59¾	24	13,000	Leghorn .	1896	1898	688,200	6–3 H.S.	1½	6 H.S.	6 H.S.	6 H.S.	6 H.S.	4 *8-in.*, 10 *6-in.*, 6 *4·7-in.*, 4 *2·2-in.*, 2 L., 2 M.	4	19·8	1100	500
c.d.s.b.	Independencia .	2336	230	44¼	13	3000	Birkenhead .	1891	1893	176,000	8 comp.	2	..	8 comp.	8 comp.	..	2 *9·4-in.*, 4 *4·7-in.* (A), 4 *3-pr.* (A), 4 M.	..	14·4 *t*	340	225
c.d.s.b.	Libertad . . .	2336	230	44¼	13	3000	Birkenhead .	1890	1892	176,000											
b.	Moreno . . Rivadavia .	27600*	585	98	27½	39,500 B. & W. Curtist.	Camden, N.J. (N.Y.S. Co.) Quincy, Mass.	1911	1914	2,200,000	12–10 K.S.	3+2	9–6 K.S.	9 K.S.	12–9 K.S.	6 K.S.	12 *12-in.*, 12 *6-in.*, 16 *4-in.*, 10 smaller.	2 sub.	22·5 *t*	1600 4000	1046
a.c.	Pueyrredon . .	6773	328	53¾	24	13,000 B.	Sestri Ponente	1898	1901	782,000	6–3 H.S.	1½	6 H.S.	5 H.S.	6 H.S.	6 H.S.	2 *10-in.*, 10 *6-in.*, 6 *4·7-in.*, 4 *2·2-in.*, 2 M.	4	20·1 *t*	1000	500

* Normal; 30,000 tons full load; oil fuel 600 tons.

ARGENTINE REPUBLIC.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
cr.	**Buenos Aires**	4780	396	47½	19	17,000	Elswick	1895	1895	383,000	..	4½	2 *8-in.* (A.), 4 *6-in.*, 6 *4·7-in.*	3	23·2 *t*	1000	429
to.g.b.	**Espora**	520	210	25	8	3500 Y	Birkenhead	1890	1891	..	..	..	2 *3-in.*, 4 *1·8-in.*, 2 M.	5	20·0	180	124
cr.	**Nueve de Julio**	3570	354	44	19½	14,350	Elswick	1892	1892	293,000	4½	4½	4 *6-in.* (A.), 8 *4·7-in.*, 4 *3-pr.*	5	22·74 *t*	770	300
to.g.b.	**Paraná**	1000	240	32¼	7½	..	Elswick	1908	1909	..	1	3–2*	2 *6-in.* Howitzers, 6 *12-pr.*, 8 M., 4 *12-pr.* field.	..	15·0	120	150
to.g.b.	**Patria**	1070	250	31	10	4500	Birkenhead	1893	1894	87,000	..	..	2 *4·7-in.*, 4 *8-pr.*, 2 *3-pr.*, 2 M.	5	20·75 *t*	288	159
to.g.b.	**Rosario**	1000	240	32¼	7½	..	Elswick	1908	1909	..	1	3–2*	2 *6-in.* Howitzers, 6 *12-pr.*, 8 M., 4 *12-pr.* field.	..	15·0	120	150
cr.	**25 de Mayo**	3200	325	43	16	13,800	Elswick	1890	1892	260,000	4½	4½	2 *8·2-in.* (A.), 8 *4·7-in.*, 4 *3-pr.*	6	22·43 *t*	600	185

* Side.

The training-ship (cruiser) Presidente Sarmiento, 2750 tons, 2000 I.H.P. (locomotive and Niclausse boilers), and 13 knots speed, with 19 guns and three torpedo tubes; launched by Messrs. Laird, 1897. There are several small gunboats.

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AUSTRIA-HUNGARY.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Second-ary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal	Complement.
		tons.	ft.	ft.	ft.						in.	in.	in.	in.	in.	in.			knots.	tons.	
b.	**Arpád** **Babenberg**	8208	354¼	65¾	23¼	15,000 B.	Trieste	1901 1902	1903 1904	650,900 667,000	8½ K.S.	2½	4 K.S.	8 K.S.	8¼ K.S.	5 K.S.	3 *9·4-in.*, 12 *5·9-in.*, 10 *2·8-in.*, 8 M., 2 l.	2 (sub)	19·6 *t*	500 840	638
c.d.s.	**Budapest**	5462	305	55¾	21	9185 B.	Trieste	1896	1897	400,600	10½ H.S.	2½	3¼ H.S.	8 H.S.	10½ H.S.	3¼ H.S.	4 *9·4-in.*, 6 *5·9-in.*, 12 *1·8-in.*, 6 M., 2 l.	4	17·8 *t*	500	450
b. *b.* *b.*	**Erz. Friedrich** **Erz. Karl** **Erz. Ferdinand Max**	10433	390½	72¼	24¼	18,130 *t* 18,000 Y.	Trieste	1904 1903 1905	1906 1905 1907	912,500	8¼ K.S.	3	5 K.S.	8 K.S.	9¼ K.S.	7 K.S.	4 *9·4-in.*, 12 *7·5-in.*, 12 *2·8-in.*, 6 *1·8 in.*, 8 M., 2 l.	2 sub.	20·56 *t* 20·36 *t* 20·0	1315	875
b.	**Erz. Franz Ferdinand**	14226	450¾	80½	26½	20,600 Y. *t*	Trieste	1908	1910	..	9-7½ K.S.	2	6 K.S.	6 K.S.	10 K.S.	8 K.S.	4 *12-in.*, 8 *9·4-in.*, 20 *3·9-in.*, 6 *12-pr.*, 2 M.	3 sub.	20·6 *t*	750 1200	816
b.	**Habsburg**	8208	354¼	65¾	23¼	15,000 B.	Trieste	1900	1902	626,000	8½ H.S.	2½	4 H.S.	8 H.S.	8¼ H.S.	5 H.S.	3 *9·4-in.*, 12 *5·9-in.*, 10 *2·8-in.*, 8 M., 2 l.	2 (sub)	19·6 *t*	500 840	638
a.c	**Kaiserin Maria Theresia**	5187	351	52½	21¼	9755	Trieste	1893	1895 1910	304,187	4	2	..	4	4	4	2 *7·5-in.*, 8 *5·9-in.*, 2 *2·8-in.*, 14 *1·8-in.*, 5 M., 2 l.	4	19·0	740	502
a.c	**Kaiser Karl VI.**	6151	367½	56	20¼	12,800 B.	Trieste	1898	1900	429,000	10 H.S.	1½	6 H.S.	8 H.S.	8¾ H.S.	6 H.S.	2 *9·4-in.*, 8 *5·9-in.*, 16 *1·8-in.*, 4 M., 2 l.	4	20·7 *t*	800	535
c.d.s.	**Monarch**	5550	305	55¾	21	8900	Pola	1895	1896	399,062	10½ H.S.	2½	3¼ H.S.	8 H.S.	10½ H.S.	3¼ H.S.	4 *9·4-in.*, 6 *5·9-in.*, 12 *1·8-in.*, 6 M., 2 l.	4	17·4 *t*	500	450
b.	**Prinz Eugen**	20000	495	89½	27	25,000 P. tur. Y.	Trieste	1912	..	2,500,000	11-4¾ K.S.	2½	6 K.S.	..	12 K.S.	6 K.S.	12 *12-in.*, 12 *5·9-in.*, 18 *12-pr.*, 6 smaller	4 (sub)	20·5	900 2000	1000
b.	**Radetzky**	14226	450¾	80½	26½	20,000 Y.	Trieste	1909	1911	..	9-7½ K.S.	2	6 K.S.	6 K.S.	10 K.S.	8 K.S.	4 *12-in.*, 8 *9·4-in.*, 20 *3·9-in.*, 6 *12-pr.*, 2 M.	3 (sub)	20·5	750 1200	816
a. c.	**St. Georg**	7185	383¾	61¾	21¼	15,270 *t*, Y.	Pola	1903	1906	581,583	8¼-6½ K.S.	1½	5 K.S.	7 K.S.	8¼-5¼ K.S.	6 K.S.	2 *9·4-in.*, 5 *7·5-in.*, 4 *5·9-in.*, 9 *2·8-in.*, 14 M., 2 l.	2 (sub)	22 *t*	1000	628
b.	**Szent Istvan** **Tegetthoff** **Viribus Unitis**	20000	495	89½	27	25,000 A.E.G.tur 25,000 P. tur. Y.	Fiume Trieste Trieste	1914 1912 1911	.. 1913 1913	2,500,000	11-4¾ K.S.	2½	6 K.S.	..	12 K.S.	6 K.S.	12 *12-in.*, 12 *5·9-in.*, 18 *12-pr.*, 6 smaller	4 (sub)	20·7 *t*	900 2000	1000
c.d.s.	**Wien**	5550	305	55¾	21	8480	Trieste	1895	1897	397,850	10½ H.S.	2½ H.S.	3¼ H.S.	8 H.S.	10½ H.S.	3¼ H.S.	4 *9·4-in.*, 6 *5·9-in.*, 12 *1·8-in.*, 6 M., 2 l.	4	17·6 *t*	500	450
b.	**Zrinyi**	14226	450¾	80½	26½	20,000 Y.	Trieste	1910	1911	..	9-7½ K.S.	2	6 K.S.	6 K.S.	10 K.S.	8 K.S.	4 *12-in.*, 8 *9·4-in.*, 20 *3·9-in.*, 6 *12-pr.*, 2 M.	3 sub.	20·5	750 1200	816

The programme includes four battleships of 24,500 tons. There are six armoured river monitors, Bodrog, Körös, Leitha, Maros, Szamos, and Temes, of 300–437 tons displacement. Two others are to be completed, 1914.

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AUSTRIA-HUNGARY.—Cruising Ships, &c.

Class	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
to. cr.	**Admiral Spaun***	3500	416¾	42	15½	21,000 Y. tur.	Pola	1909	1910	..	1	..	7 *3·9-in.*, 2 M.	2	26·0	450 850	320
to. cr.	**Aspern**	2362	301¾	39½	14¼	7300 Y	Pola	1899	1901	155,000	2	..	8 *4·7-in.*, 8 *1·8-in.*, 4 M.	1	20·0	470 500	305
to. cr.	**Helgoland***	3500	416¾	42	15½	25,000 Tur.	Monfalcone	1912	..	..	1	..	9 *3·9-in.*, 4 smaller	2	27·0	450 850	320
cr. 2nd cl.	**Kaiserin Elizabeth**	4000	321½	47½	18½	8000	Pola	1890	1892	..	2¼	3½	2 *9·4-in.* (K.), 6 *5·9-in.* do., 13 *1·8-in.*, 4 M., 2 l.	5	19·0	660	418
cr. 2nd cl.	**Kaiser Franz Josef I.**	3966	321½	47½	18½	8000	Trieste	1889	1891	..	2¼	3½	2 *9·4-in.* (K.), 6 *5·9-in.* do., 16 *1·8-in.*, 2 l.	5	19·0	660	426
to. g. b.	**Magnet**	502	220	26¾	8	5000 T	Elbing	1896	1899	51,052	..	..	6 *1·8-in.*	3	26·0 *t*	105	80
to. cr.	**Novara***	3500	416¾	42	15½	25,000 Tur.	Fiume	1913	..	..	1	..	9 *3·9-in.*, 4 smaller	1	27·0	450 850	320
to. cr.	**Saida***	3500	416¾	42	15½	25,000 Tur.	Monfalcone	1912	..	..	1	..	9 *3·9-in.*, 4 smaller	1	27·0	450 850	320
to. g. b.	**Satellit**	531	220	26¾	9¼	4000	Elbing	1893	1893	..	1½	..	1 *2·8-in.*, 8 *1·8-in.*	..	21·87	76	84
to. cr.	**Szigètvár**	2313	301¾	39½	14¼	7300 Y.	Pola	1899	1901	155,000	2	..	8 *4·7-in.*, 8 *1·8-in.*, 4 M.	1	20·0	470 500	305
to. g. b.	**Trabant**	522	220	23	8¼	3500	Trieste	1890	1891	..	..	..	2 *2·8-in.*, 8 *1·8-in.*	1	20·0	..	84
to. cr	**Zenta**	2264	301¾	39½	12¼	7300 Y.	Trieste	1897	1899	143,780	2	..	8 *4·7-in.*, 8 *1·8-in.*, 4 M.	1	20·9 *t*	470 500	305

* 2¼ in. side armour and 2 in. bulkhead.

The programme of 1914–15 includes three cruisers of 4800 tons.
Mining vessel, Chamäleon, 1000 tons. Pelikan, 2431 tons, submarine tender.
Donau, training corvette (2307 tons). A submarine depôt and salvage vessel, 950 tons, 15 knots.
Tender and repair ship for flotillas, Gaea (*ex* Fürst Bismarck). Fleet colliers, Pola and Teodo, 7000 tons.

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BRAZIL.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkheads.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Second-ary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in	in.	in.	in.			knots.	tons.	
c.d.s., t.	Marshal Deodoro	3112	267½	48	13¼	3400 D'A.	La Seyne	1898	1900	..	13¾–4 H.S.	1½	..	..	8 H.S.	3 H.S.	2 9·4-in., 4 4·7-in., 2 M., 4 6-pr., 2 1-pr.	2 (sub.)	15·0	236	200
c.d.s., t.	Marshal Floriano							1899	1901												
b.	Minas Geraes	19,281	500	83	25	27,212 t B.&W.	Elswick	1908	1909	1,821,400	9–6–4 K.S.	2	9–6–4 K.S.	9	12–8 K.S.	9 K.S.	12 12-in., 22 4·7-in., 8 3-pr.	4	21·4 t	900 2400	900
b.	São Paulo	19,281	500	83	25	28,645 t B.&W.	Barrow	1909	1910	1,821,400	9–6–4 K.S.	2	9–6–4 K.S.	9 K.S.	12–8 K.S.	9 K.S.	12 12-in., 22 4·7-in., 8 3-pr.	4	21·6 t	900 2400	900
mon.	Javary							1913													
mon.	Medeira	1250	265	49	4½	..	Barrow	1913	..	..	..	..	..	..	..	..	2 6-in., 2 4·7-c., Howitzers, 4 3-pr., 6 M.	..	11½	..	100
mon.	Solimões							1914													

Also river monitors Maranhao and Pernambuco, built at Rio de Janeiro.

BRAZIL.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
cr.	Bahia	3100	380	39	13½	17,500 tur.	Elswick	1909	1910	328,500	¾–1½	..	10 4·7-in., 8 1·8-in.	2	27·0 t	650	260
"	Barroso	3600	330	43¾	16¾	7500	Elswick	1896	1897	..	3	4½ shields	6 6-in., 4 4·7-in., 10 6-pr., 4 1-pr., 4 M.	3	20·0	700	300
"	Benjamin Constant	2707	236	46	18	2800	La Seyne	1892	1894	..	2	..	4 6-in., 8 4·7-in., 8 M., 4 l.	4	14·0	260	287
"	Republica *	1300	210	35	13	750	Elswick	1892	1894	..	2–1	..	6 4·7-in., 4 6-pr., 6 M.	4	17·0	170	160
"	Rio Grande do Sul	3100	380	39	13½	17,500 tur.	Elswick	1909	1910	328,500	..	..	10 4·7-in., 8 1·8-in.	2	27·4 t	650	260
to.cr.	Tamoyo	1063	269	28¾	9¾	6500	Kiel	1898	1900	..	..	4½ shields	2 4·1-in., 6 2·2-in., 2 1·4-in., 2 M.	3	23·0	293	110
"	Timbira	1014	249½	30¾	10¼	7000	Kiel	1896	1897	..	½	4½ shields	2 4·1-in., 6 2·2-in., 2 1·4-in., 2 M.	3	22·5	250	110
"	Tupy	1014	249½	30¾	10¼	7000	Kiel	1896	1897	..	½	4½ shields	2 4·1-in., 6 2·2-in., 2 1·4-in., 2 M.	3	22·5	250	110

Eleven screw gunboats, 200 tons to 400 tons, and four 12-knot river gunboats built at Poplar. Two river gunboats built by Messrs. Yarrow were sent out in sections, 1907.

* Converted into a mine-layer.

Almirante Tamandare (launched 1890), 4560 tons, gunnery ship. Tiradentes (189), 800 tons, training ship.

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CHILE.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Second-ary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			kts.	tons.	
b.	Almirante Latorre . Almirante Cochrane .	28,000	625	92	28½	37,000 P.tur.Y.	Elswick . Walker .	1913 Bldg.	.. ..	..	9–6 K.S.	4–12	4½ K.S.	..	10 K.S.	6 K.S.	10 *14-in.*, 16 *6-in.*, several smaller, 4 M.	4 (sub.)	23	1200 4000	1000
a.c.	Almirante O'Higgins .	8500	411¾	62½	22	16,000 B.	Elswick .	1897	1898	..	7–5	2	..	..	7½–6	6	4 *8-in.*, 10 *6-in.*, 4 *4·7-in.*, 10 *12-pr.*, 10 *6-pr.*, 4 M.	3 (2 sub.)	21·5 *t*	1260	500
b.	Capitão Prat . . .	5981	328	60¾	21¾	12,000	La Seyne	1890	1893	391,000	12	3	4	..	10½	2	4 *9·4-in.* (Canet), 8 *4·7-in.* (Canet), 10 *12-pr.*, 14 smaller and M.	4	18·3 *t*	775	480
a.c.	Esmeralda . . .	7020	436	53¼	22¼	16,000	Elswick .	1896	1897	..	6 H.S.	2	..	6 H.S.	4½ Shields	..	2 *8-in.*, 16 *6-in.*, 8 *12-pr.*, 2 *3-pr.*, 4 M.	3 (2 sub.)	22·8 *t*	1350	500

Capitão Prat reconstructed.

Cruising Ships, &c.

Class	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.						in.	in.			knots.	tons.	
cr	Blanco Encalada . .	4400	370	46½	18½	14,500	Elswick .	1893	1894	..	4–1¾	..	2 *8-in.*, 10 *6-in.*, 12 *3-pr.*, 10 *1-pr.**	5	22·78 *t*	900	427
„	Chacabuco . . .	4500	360	46	18	15,750	Elswick .	1901	1903	..	4½–1¾	..	2 *8-in.*, 10 *4·7-in.*, 16 *1·8-in.*, 2 M., 1 l.	5	23·0	1000	350
„	General Baquedano (Training)	2330	240	45¾	18	1500 B.	Elswick .	1898	1900	..	..	..	4 *4·7-in.*, 2 *12-pr.*, 2 *6-pr.*, 2 M., 1 l.	1	13·7 *t.*	300	302
„	Ministro Zenteno . .	3600	330¼	43¾	16¾	6500	Elswick .	1896	1898	..	..	..	8 *6-in.*, 10 *6-pr.*, 4 *1-pr.** .	3	20·0*t*	800	280
„	Presidente Errázuriz .	2047	268	35¾	19½	5400	La Seyne	1890	1892	..	3½	..	4 *6-in.* (Canet), 2 *5-in.*, 4 *2·2-in.*, 6 M.	3	19·0	200	171

* Armstrong.

Two Gunboats of 145 tons displacement and one of 180 tons.

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CHINA.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.						in.	in.			kts.	tons.	
cr.	Chao Hao	2750	330	42	13¼	6000 P. tur.	Elswick	1911	1912	..	¾	..	2 6-in., 4 4-in., 2 3-in., 6 3-pr., 2 l.	2	22·0	150 550	330
to.g.b.	Fei-Ying	837	257¼	28½	12½	4500 Y.	Stettin	1895	1895	..	..	2	2 4-in., 6 3·4-in., 4 smaller	3	21·8 t	75	90
cr.	Hai-Chi.	4300	396	46¾	18½	17,000	Elswick	1898	1899	..	5	6	2 8-in., 10 4·7-in., 12 3-pr., 4 1·4-in., 6 M.	5	24·0	300	374
„	Hai-Shen							1898	1898								
„	Hai-Shew	2903	314¾	41	16	8000	Vulcan. Stettin.	1897	1898	..	3	2	3 6-in. (K.), 8 4-in., 6 1·4-in. Hotchkiss, 6 M.	3 (1 sub.)	20·7 t	220 500	244
„	Hai-Yung							1897	1898								
to.cr.	Kien-Wei	861	256	26½	10½	7000 N.S.	Foochow	1900	1902	..	..	..	1 3·9-in., 3 2·5-in., 6 1·4-in.	2	22·5	360	300
„	Kien-Gnan						Foochow	1899	1902	..	..	..					
g.b.	Tchu-Tai	552	..	..	..	..	Kobe	1906	1908	..	..	..	2 4·7-in., 2 12-pr.	..	13·0	..	..
cr.	Ying Swei	2500	330	42	13	6000	Barrow	1911	1912	..	¾	..	2 6-in., 4 4-in., 2 3-in., 6 3-pr., 2 l.	2	22·0	150 550	330
cr.	Three	..	330¼	39	13¼	30,000 Y. P. tur.	Monfalcone	Pro.	..	..	..	..	10 3·9-in.	2	32·0	..	..

Yung-Fung, Yung-Chiang, Yung Hsiang, 800 tons, 13·5 knots, one 4-in. and smaller guns, Yangtsze gunboats, built in Japan, 1912. Two river gunboats of 150 tons built at the Germania Yard, Kiel. At the Kawasaki Yard, Kobe, the Kiang Heng, Jsu Jang, and other small cruisers, or gunboats, have lately been built. Admiralty yacht Wufung, 500 tons, 14 knots, built at Kiao-chau. The cruiser Fei-Hung, 2600 tons, built at Camden, N.J., has been sold to Greece.

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DENMARK.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Second-ary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
c.d.s.,t.	Herluf Trolle	3415	271	50	16¼	4200 T.	Copenhagen	1899	1901	..	8–4 H.S	2	7 H.S.	..	6 H.S.	6 H.S.	2 9·4-in., 4 5·9-in., 10 2·2-in., 8 smaller.	3 (sub.)	16·0	250	250
c.d.s.,t.	Iver Hvitfeldt	3208	242	49½	18	5100	Copenhagen	1886	1889	200,000	12	2	..	9½	8	..	2 10·2-in. (K.), 10 6-pr., 8 M.	4 (1 sub.)	15·6	250	298
c.d.s.,t.	Niels Juel	3675	274¼	51½	16¼	4600	Copenhagen	Bldg.	1900	..	3–4 K.S.	2	..	..	7 K.S.	6 K.S.	2 9·4-in., 4 5·9-in., 18 smaller	4 (sub.)	16	250	250
c.d.s.,t.	Olfert Fischer	3415	271	50	16¼	4200	Copenhagen	1903	1905	..	8–4 K.S.	2	7 K.S.	..	6 K.S.	6	2 9·4-in., 4 5·9-in., 10 2·2-in., 8 smaller.	3 (sub.)	16·0	250	250
c.d.s.,t.	Peder Skram	3543	274¼	51½	16¼	4600	Copenhagen	1908	1909	..	8–4 K.S.	2	..	..	7 K.S.	6 K.S.		4	16·5	250	250
c.d.s.,t.	Skjold	2115	226½	38	13½	2200 T.	Copenhagen	1896	1899	..	9	2	..	7	8	4½	1 9·4-in., 3 4·7-in. (K.), 4 1·8-in., 1 M.	4	13·0	280	210

DENMARK.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.				tons.	
3rd cl. cr.	Geiser	1260	257½	27½	11¼	3000 T.	Copenhagen	1892	1893	..	1½	..	2 4·7-in., 4 3·4-in., 6 M.	4	17·1	125	155
„	Heimdal	1260	257½	27½	11¼	3000 T.	Copenhagen	1894	1896	..	1½	..	2 4·7-in., 4 3-pr., 6 M.	4	17·5	125	155
„	Hekla	1260	233	32¾	11¼	3000 T.	Copenhagen	1890	1893	..	1½	..	2 6-in., 4 2·2-in., 6 M.	4	17·0	125	155

Two obsolete cruisers, Fyen (2580 tons) and Valkyrien (2854 tons).

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FRANCE.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Second-ary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
a.c.	**Aube** (Amiral)	9856	453	66¼	24½	22,155 t. B.	St. Nazaire	1902	1904	973,440	6–4 H.S.	2	5–2 H.S.	..	7½ H.S.	6½–5 H.S.	2 *7·6-in.*, 8 *6·4-in.*, 6 *3·9-in.*, 20 small Q.F. and M.	2 (sub.)	21·9 *t*	970 1590	615
t.	**Béarn**	24,830	574½	88½	29	36,000 T. Nic.	La Seyne	Pro.	..	..	12½–7 K.S.	2¾	7 K.S.	..	12½ K.S.	7 K.S.	12 *13·4-in.*, 24 *5·5-in.*, 4 *3-pr.*	6 (sub.)	21·0 *t*	900 2700	998
b.	**Bouvet**	12,007	401¼	70¼	27½	14,000 B.	Lorient	1896	1898	1,100,770	15¾–8 H.S.	3½	4 H.S.	..	14½ H.S.	4 H.S.	2 *12-in.*, 2 *10·8-in.*, 8 *5·5-in.*, 8 *3·9-in.*, 19 small Q.F. and M.	2 (sub.)	18·2 *t*	621	621
b.	**Brennus**	11,190	361	67	26¼	14,000 B.	Lorient	1891	1893	991,767	15¾ *comp.*	4	4¾ *comp.*	..	17¾ *comp.*	4¾ *comp.*	3 *13·4-in.*, 10 *6·4-in.*, 23 small Q.F. and M.	4	17·1 *t*	800	696
b.	**Bretagne**	23,177	546	88½	29	29,000 tur.	Brest	1913	..	2,589,439	11–7 K.S.	2¾–1¾	7 K.S.	7 K.S.	10½ K.S.	7 K.S.	10 *13·4-in.*, 22 *5·5-in.*, 8 small Q.F. and M.	4 (sub.)	20·0	900 2700	1167
a.c.	**Bruix**	4735	365¼	46	19¾	9049 B.	Rochefort	1894	1896	409,622	3¾–2¾	2	3¾	..	3¾	3¾	2 *7·6-in.*, 6 *5·5-in.*, 4 *2·5-in.*, 4 *1·8-in.*, 4 *1·4-in.*, M.	4	18·3 *t*	406	391
b.	**Carnot**	11,954	382¼	70½	27¼	16,300 t. D'A.	Toulon	1894	1897	1,070,088	17¾–9 *comp.*	2¾	4	..	14½	4	2 *12-in.*, 2 *10·8-in.*, 8 *5·5-in.*, 4 *2·5-in.*, 16 *1·8-in.*, 10 *1·4-in.*, and M.	2 (sub.)	17·86 *t*	705	625
b.	**Charlemagne**	11,108	385½	66¼	27½	14,500 B.	Brest	1895	1898	1,096,432	15¾ H.N.	3½	3 H.N.	..	15¾ H.N.	3 H.N.	4 *12-in.*, 10 *5·5-in.*, 8 *3·9-in.*, 16 *1·8-in.*, 10 *1·4-in.*, 8 M.	2 (sub.)	18·1 *t*	680 1100	631
b.	**Charles Martel**	11,693	392½	71	27¼	14,996 t. D'A.	Brest	1893	1897	1,092,830	17¾	3½	4	..	15¾	4	2 *12-in.*, 2 *10·8-in.*, 8 *5·5-in.*, 4 *2·5-in.*, 14 *1·8-in.*, 5 *1·4-in.*	2 (sub.)	18·1 *t*	677	632
a.c.	**Charner** (Amiral)	4702	348	46	19¼	8300 B.	Rochefort	1893	1895	353,200	3¾–2¾	2	3¾	..	3¾	3¾	2 *7·6-in.*, 6 *5·5-in.*, 14 small Q.F. and M.	4	18·2 *t*	413	375
a.c	**Condé**	9856	453	63¾	24½	22,175 Nic.	Lorient	1902	1904	863,799	6–4 H.S.	2	5–2 H.S.	..	7½ H.S.	6½–5 H.S.	2 *7·6-in.*, 8 *6·4-in.*, 6 *3·9-in.*, 16 *1·8-in.*, 6 *1·4-in.*	2 (sub.)	21·4 *t*	970 1590	615
b.	**Condorcet**	18,028	476	84	27	22,500 N. tur.	St. Nazaire	1909	1911	2,165,200	10–8 K.S.	2¾	8¾	..	12 K.S.	8¾ K.S.	4 *12-in.*, 12 *9·4-in.*, 16 *12-pr.*, 8 *3-pr.*, 2 *1-pr.*	2 (sub.)	19·8 *t*	960 2010	690
b.	**Courbet**	23,100	516	88½	29	28,000 N. tur.	Lorient	1911	1913	2,508,388	11–7 K.S.	2¾–1¾	7 K.S.	7 K.S.	10½ K.S.	7 K.S.	12 *12-in.*, 22 *5·5-in.*, 4 *3-pr.*	4 (sub.)	20·0	900 2700	998
b.	**Danton**	18,028	476	84	27	22,500 B. tur.	Brest	1909	1911	2,068,000	10–8 K.S.	2¾	8¾	..	12 K.S.	8¾ K.S.	4 *12-in.*, 12 *9·4-in.*, 16 *12-pr.*, 8 *3-pr.*, 2 *1-pr.*	2 (sub.)	20·18 *t*	960 2010	690
b.	**Démocratie**	14,635	438¾	79½	27¼	19,190 B.	Brest	1904	1907	1,473,180	11–7 H.S.	2¾	8 H.S.	..	12 H.S.	6 H.S.	4 *12-in.*, 10 *7·6-in.*, 26 *1·8-in.*, 2 *1·4-in.*	2 (sub.)	19·44 *t*	905 1285	793

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FRANCE.—Armoured Ships—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Second-ary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
a.c.	**Desaix** . shd.	7578	426½	58¼	24¼	17,715 *t* B.	St. Nazaire	1901	1903	762,759	4–3 H.S.	2¾	..	..	3½ H.S.	..	8 *6·4-in.*, 4 *3·9-in.*, 10 *1·8-in.*, 4 *1·4-in.*	2	21·7 *t*	880 / 1200	531
b.	**Diderot** . .	18,028	476	84	27	22,500 N. tur.	St. Nazaire	1909	1911	2,167,000	10–8 K.S.	2¾	8¾	..	12 K.S.	8¾	4 *12-in.*, 12 *9·4-in.*, 16 *12-pr.*, 8 *3-pr.*, 2 *1-pr.*	2 (sub.)	19·75 *t*	960 / 2010	690
a.c.	**DupetitThouars**	9367	452¾	63¾	24½	22,000 *t* B.	Toulon .	1901	1905	831,839	6 H.S.	2	3¾ H.S.	6 H.S.	6 H.S.	3¾ H.S.	2 *7·6-in.*, 8 *6·4-in.*, 4 *3·9-in.*, 16 *1·8-in.*, 6 *1·4-in.*	2 (sub.)	22·5 *t*	1020 / 1600	610
a.c.	**Dupleix** . shd.	7578	426½	58¼	24¼	17,100 B.	Rochefort .	1900	1903	652,354	4–3 H.S.	2¾	..	..	3½ H.S.	..	8 *6·4-in.*, 4 *3·9-in.*, 10 *1·8-in.*, 4 *1·4-in.*	2	21·0	880 / 1200	531
a.c.	**Edgard Quinet**	13,780	515	70¼	27½	39,803 *t* B.	Brest .	1907	1911	1,307,536	6½–3½ K.S.	2½–1¼	5–2 K.S	4¾ K.S.	8 K.S.	4¾ K.S.	14 *7·6-in.*, 20 *2·4-in.*, 2 smaller.	2 (sub.)	23·9 *t*	1242 / 2300	738
a.c.	**Ernest Renan** .	13,427	515	70½	26¾	37,500 Nic., *t*	St. Nazaire	1906	1909	1,410,000	6¾–4 H.S.	2	5–3 H.S.	4¾	6 H.S.	5 H.S.	4 *7·6-in.*, 12 *6·4-in.*, 16 *9-pr.*, 8 *3-pr.*	2 (sub.)	25·5 *t*	1354 / 2300	674
b.	**Flandre** . .	24,830	574¼	88½	28¼	34,800 P.	Brest .	Bldg.	..	2,589,439	12½–7 K.S.	2¾	7 K.S.	..	12½ K.S.	7 K.S.	12 *13·4-in.*, 24 *5·5-in.*, 4 *3-pr.*	6 (sub.)	21·0	900 / 2700	1100
b.	**France** . .	23,100	546	88½	29	28,000 N. tur.	St. Nazaire	1912	..	2,603,920	11–7 K.S.	2¾–1¾	7 K.S.	7 K.S.	10½ K.S.	7 K.S.	12 *12-in.*, 22 *5·5-in.*, 8 *3-pr.* Q.F. and M.	4 (sub.)	20·0	900 / 2700	998
b.	**Gascogne** . .	24,830	574¼	88½	28¼	34,800 P.	Lorient .	Bldg.	..	2,589,139	12½–7 K.S.	2¾	7 K.S.	..	12½ K.S.	7 K.S.	12 *13·4-in.*, 24 *5·5-in.*, 4 *3-pr.*	6 (sub.)	21·0	900 / 2700	1100
b.	**Gaulois** . .	11,105	385½	66½	27½	14,500 B.	Brest .	1896	1899	1,093,925	15¾ H.N.	3½–1½	3 H.N.	..	15¾ H.N.	3 H.N.	4 *12-in.*, 10 *5·5-in.*, 8 *3·9-in.*, 16 *1·8-in.*, 10 *1·4-in.*, 8 M.	2 (sub.)	18·0	680 / 1100	632
a.c.	**Gloire** . .	9856	453	63¾	24½	20,500 Nic.	Lorient .	1900	1904	883,269	6–4 H.S.	2	5–2 H.S.	..	7½ H.S.	6½–5 H.S.	2 *7·6-in.*, 8 *6·4-in.*, 6 *3·9-in.*, 16 *1·8-in.*, 6 *1·4-in.*	2 (sub.)	21·0	970 / 1590	615
a.c.	**Gueydon** . (Amiral) .	9367	459	63¾	24½	20,200 Nic.	Lorient .	1899	1902	817,994	6–3¾ H.S.	2	3¾ H.S.	6 H.S.	6 H.S.	3¾ H.S.	2 *7·6-in.*, 8 *6·4-in.*, 4 *3·9-in.*, 16 *1·8-in.*, 6 *1·4-in.*	2 (sub.)	21·0	1020 / 1600	610
b.	**Henri IV.** .	8807	354½	72	23	11,500 Nic.	Cherbourg.	1899	1902	801,248	11–7 H.S.	3	4¾ H.S.	..	11¾ H.S.	5 H.S.	2 *10·8-in.*, 7 *5·5-in.*, 12 *1·8-in.*, 2 M.	2 (sub.)	17·2 *t*	735 / 1100	464
b.	**Jauréguiberry** .	11,637	364	72¾	27¾	15,800 D'A.	La Seyne .	1893	1896	1,069,536	17¾	2¾	4	..	14½	4	2 *12-in.*, 2 *10·8-in.*, 8 *5·5-in.*, 4 *2·5-in.*, 12 *1·8-in.*, 8 *1·4-in.*, 8 M.	2 (sub.)	18·07 *t*	700	625

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b.	**Jean Bart** .	**23,100**	**546**	88½	29	28,000 B. tur.	Brest .	1911	1913	2,528,888	11–7 K.S.	2¾–1¾	7 K.S.	7 K.S.	10½ K.S.	7 K.S.	12 *12-in.*, 22 *5·5-in*., 4 *3-pr.*	4 (sub.)	20·0	900 2700	998
a.c.	**Jeanne d'Arc** .	**11,092**	**477½**	63¾	26½	28,000 Guyot	Toulon .	1899	1903	875,847	6–3 H.S.	2·2	3 H.S.	..	6 H.S.	5 H.S.	2 *7·6-in.*, 14 *5·5-in.*, 16 *1·8-in.*, 8 *1·4 in.*, 2 M.	2 (sub.)	21·7 *t*	1400 2000	626
,,	**Jules Ferry** .	**12,351**	**480½**	70¼	27	28,753 Guyot	Cherbourg	1903	1906	1,169,940	6¾–4 H.S.	2	5–3 H.S.	6	6 H.S.	5 H.S.	4 *7·6-in.*, 16 *6·4-in.*, 22 *1·8-in.*, 2 *1·4-in.*	2 (sub.)	22·8 *t*	1320 2100	728
,,	**Jules Michelet** .	**12,370**	**480½**	70¼	27	27,700 Guyot	Lorient .	1905	1908	1,204,107	6–4 K.S.	2	5–3 K.S.	6 H.S.	8 K.S.	5 K.S.	4 *7·6-in.*, 12 *6·4-in.*, 24 *1·8-in.*, 2 *1·4-in.*	2 (sub.)	23·2 *t*	1320 2100	724
b.	**Justice** . .	14,635	438¾	79½	27½	18,548 Nic. *t.*	La Seyne .	1904	1907	1,670,385	11–7 H.S.	2¾	8 H.S.	..	12 H.S.	6 H.S.	4 *12-in.*, 10 *7·6-in.*, 26 *1·8-in.*, 2 *1·4-in.*	2 (sub.)	19·43 *t*	905 1825	793
a.c.	**Kléber** . shd.	7578	426½	58¼	24¼	18,000 Nic.	Bordeaux .	1902	1904	770,320	4–3 H.S.	2¾	..	..	3½ H.S.	..	8 *6·4-in.*, 4 *3·9-in.*, 10 *1·8-in.*, 4 *1·4-in.*	2	21·2 *t*	880 1200	531
b.	**Languedoc** .	24,830	574¼	88½	28¼	34,800 P.	La Seyne .	Bldg.	..	2,642,439	12½–7 K.S.	2¾	7 K.S.	..	12½ K.S.	7 K.S.	12 *13·4-in.*, 24 *5·5-in.*, 4 *3-pr.*	6 (sub.)	21·0	900 2700	1100
a.c.	**Léon Gambetta**	12,351	480½	70¼	27	27,500 Nic.	Brest .	1901	1904	1,169,940	6¾–4 H.S.	2	5–3 H.S.	6	8 H.S.	5 H.S.	4 *7·6-in.*, 16 *6·4-in.*, 22 *1·8-in.*, 2 *1·4-in.*	2 (sub.)	23·06 K.	1320 2100	728
b.	**Lorraine** . .	23,177	546	88½	29	29,000 tur.	St. Nazaire	1913	..	2,642,439	11–7 K.S.	2¾–1¾	7 K.S.	7 K.S.	10½ K.S.	7 K.S.	10 *13·4-in.*, 22 *5·5-in.*, 8 small Q. F. & M.	4 (sub.)	20·0	900 2700	1167
a.c.	**Marseillaise** .	9856	453	63¾	24½	20,500 B.	Brest .	1900	1903	881,270	6 4 H.S.	2	5–2 H.S.	..	7½ H.S.	6½–5 H.S.	2 *7·6-in.*, 8 *6·4-in.*, 6 *3·9-in.*, 2 *2·5-in.*, 18 *1·8-in.*, 6 *1·4-in.*	2 (sub.)	21·0	970 1590	615
b.	**Masséna** . .	11,735	384¾	66	27	13,500 D'A.	St. Nazaire	1895	1898	1,100,400	17¾–9¾	3½	4 H.S.	16	15¼15¾ H. S.	4	2 *12-in.*, 2 *10·8-in.*, 8 *5·5-in.*, 8 *3·9-in.*, 12 *1·8-in.*, 12 *1·4-in.*	2 (sub.)	17·1 *t*	630	642
b.	**Mirabeau** .	18,028	476	84	27	22,500 B. tur.	Lorient .	1909	1911	2,032,000	10–8 K.S.	2¾	8¾	..	12 K.S.	8¾ K.S.	4 *12-in.*, 12 *9·4-in.*, 16 *12-pr.*, 8 *3-pr.*, 2 *1-pr.*	2 (sub.)	19·73 *t*	960 2010	690
a.c.	**Montcalm** . .	9367	452¾	63¾	24½	19,600 N.S.	La Seyne .	1900	1902	902,809	6 H.S.	2	3¾ H.S.	6 H.S.	6 H.S.	2¾ H.S.	2 *7·6-in.*, 8 *6·4-in.*, 4 *3·9-in.*, 16 *1·8-in.*, 6 *1·4-in.*	2 (sub.)	21·0	1020 1600	612
b.	**Normandie** .	24,830	574¼	88½	28¼	34,800 P.	St. Nazaire	Bldg.	..	2,642,439	12½–7 K.S.	2¾	7 K.S.	..	12½ K.S.	7 K.S.	12 *13·4-in.*, 24 *5·5-in.*, 4 *3-pr.*	6 (sub.)	21·0	900 2700	1100
b.	**Paris** . .	23,100	546	88½	29	28,000 N. tur.	La Seyne .	1912	..	2,603,920	11–7 K.S.	2¾–1¾	7 K.S.	7 K.S.	10½ K.S.	7 K.S.	12 *12-in.*, 22 *5·5-in.*, 8 *3-pr.*, Q. F. & M.	4 (sub.)	20·0	900 2700	998

FRANCE.—Armoured Ships—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Second-ary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in	in.	in.	in.	in.			kts.	tons.	
b.	**Patrie** . .	14,635	438¾	79½	27½	17,859 *t.*Nic.	La Seyne .	1903	1906	1,674,870	11–7 H.S.	2¾	8 H.S.	..	12 H.S.	6 H.S.	4 *12-in.*, 18 *6·4-in.*, 26 *1·8-in.*, 2 *1·4-in.*	2 (sub.)	19·12 *t*	905 1825	793
b.	**Provence** .	23,177	546	88½	29	29,000 tur.	Lorient .	1913	..	2,600,195	11–7 K.S.	2¾–1¾	7 K.S.	7 K.S.	10½ K.S.	7 K.S.	10 *13·4-in.*, 22 *5·5-in.*, 8 small Q.F. and M.	4 (sub.)	20·0	900 2700	1167
b.	**République** .	14,635	438¾	79½	27½	19,626 *t.*Nic.	Brest .	1902	1906	1,523,136	11–7 H.S.	2¾	8 H.S.	..	12 H.S.	6 H.S.	4 *12-in.*, 18 *6·4-in.*, 26 *1·8-in.*, 2 *1·4-in.*	2 (sub.)	19·15	905 1825	793
b.	**Saint Louis** .	11,090	385½	66½	27½	14,500 B.	Lorient .	1896	1900	1,080,997	15¾ H.N.	3½	3 H.N.	..	3–15¾ H.N.	3 H.N.	4 *12-in.*, 10 *5·5-in.*, 8 *3·9-in.*, 16 *1·8-in.*, 10 *1·4-in.*, 8 M.	2 (sub.)	18·0	820 1150	631
b	**Suffren** .	12,527	411¾	70¼	27½	16,500 Nic.	Brest .	1899	1903	1,195,564	12–8 H.S.	2¾	5–3 H.S.	..	12 H.S.	6–5 H.S.	4 *12-in.*, 10 *6·4-in.*, 8 *3·9-in.*, 20 *1·8-in.*, 2 *1·4-in.*	2 (sub.)	18·0	1100 1820	615
b.	**Vergniaud** .	18,028	476	84	27	22,500 N. tur.	Bordeaux .	1910	1911	2,165,200	10–8 K.S	2¾	8¾	..	12 K.S.	8¾ K.S.	4 *12-in.*, 12 *9·4-in.*, 16 *12-pr.*, 8 *3-pr.*, 2 *1-pr.*	2 (sub)	19·67 *t*	960 2010	690
b.	**Vérité** .	14,635	438¾	79½	27½	20,433 *t.* B.	Bordeaux .	1907	1908	1,661,409	11–7 H.S.	2¾	8 H.S.	..	12 H.S.	6 H.S.	4 *12-in.*, 10 *7·6-in.*, 26 *1·8-in.*, 2 *1·4-in.*	2 (sub.)	19·26 *t*	905 1825	822
a.c.	**Victor Hugo** .	12,351	480½	70¼	27	28,486 *t.* B.	Lorient .	1904	1907	1,229,932	6¾–4 H.S.	2	5–3 H.S.	6	8 H.S.	5 H.S.	4 *7·6-in.*, 16 *6·4-in.*, 22 *1·8-*, 2 *1·4-in.*	2 (sub.)	22·5 *t*	1320 2100	728
b.	**Voltaire** .	18,028	476	84	27	22,500 B. tur.	La Seyne .	1909	1911	2,169,200	10–8 K.S.	2¾	8¾	..	12 K.S.	8¾ K.S.	4 *12-in.*, 12 *9·4-in.*, 16 *12-pr.*, 8 *3-pr.*, 2 *1-pr.*	2 (sub.)	20·66 *t*	960 2010	690
a.c	**Waldeck-Rousseau**	13,780	515	70¼	27½	36,110 Nic. *t.*	Lorient .	1908	1911	1,301,380	6½–3½	2½	5	4¾	6	5½	14 *7·6-in.*, 20 *2·4-in.*, 2 *1-pr.*	2 (sub.)	23·10 *t*	1242 2300	738

Pothuau, 5374 tons, gunnery training ship; Latouche-Tréville, 4681 tons, tender to gunnery ship.

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FRANCE.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
3rd cl. *cr.*	**Cassard** . . .	3890	325½	45	20½	10,143 D'A.	Cherbourg .	1896	1898	318,712	3	2 shield	6 *6·4-in.*, 4 *3·9-in.*, 10 *1·8-in.*, 3 *1·4-in.*, 2 M.	2	19·8 *t*	630	385
2nd cl. *cr.*	**Châteaurenault** shd.	7898	442¾	55¾	24½	24,300 *t.* N.S.	La Seyne .	1898	1902	606,656	2½	2 shield	2 *6·4-in.*, 6 *5·5-in.*, 10 *1·8-in.*	2	24·19 *t*	1400 / 2100	625
g. v. .	**Décidée** . . .	635	184¾	26¼	12¼	1000 Nic.	Lorient . .	1899	1900	54,100	..	..	2 *3·9-in.*, 4 *2·5-in.*, 4 *1·4-in.*	..	13·0	99	99
2nd cl. *cr.*	**D'Entrecasteaux** shd.	7995	383½	58½	25¾	13,500	La Seyne .	1896	1898	667,740	4	10–3 H.s.	2 *9·4-in.*, 12 *5·5-in.*, 12 *1·8-in.*	2	19·2 *t*	650	521
3rd cl. *cr.*	**Descartes** . shd.	3970	326	42¼	21¾	9000 B.	St. Nazaire .	1894	1896	334,725	1½	..	4 *6·4-in.*, 10 *3·9-in.*, 8 *1·8-in.*, 4 *1·4-in.*	2	21·0 *t*	552	386
„ „	**D'Estrées** . shd.	2421	311¾	39¼	17¾	8500 Nor.	Rochefort .	1897	1900	208,200	1½	..	2 *5·5-in.* 4 *3·9-in.* 8 *1·8-in.*, 2 *1 4-in.*	..	20·5 *t*	345 / 480	234
„ „	**Du Chayla** . shd.	3890	325½	45	20½	10,009 D'A.	Cherbourg .	1895	1897	315,835	3	2 shield	6 *6·4-in.*, *3·9-in.*, 10 *1·8-in.*, 3 *1·4-in.*, 2 M.	2	20·2 *t*	624	385
to. g. b. .	**Dunois** . . .	889	256	27¾	12¾	7000 N.S.	Cherbourg .	1897	1898	123,383	..	..	6 *2·5-in.*, 6 *1·8-in.* . .	..	23·0	137	128
3rd cl. *cr.*	**Friant** . . .	3882	308½	43½	20¾	9000 Nic.	Brest . .	1893	1895	308,750	3	..	6 *6·4-in.*, 4 *3·9-in.*, 8 *1·8-in.*, 6 *1·4-in.*	2	18·19	587	358

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FRANCE.—Cruising Ships, &c.—*continued.*

Class.	NAME.	Displacement.	Length.	Beam	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour: Deck.	Armour: Gun Position	Armament: Guns.	Armament: Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
2nd cl. *cr*	**Guichen** . . shd.	8151	436¼	54¾	24½	24,000 D'A.	St. Nazaire .	1897	1899	611,945	2½	2 shield	2 *6·4-in.*, 6 *5·5-in.*, 10 *1·8-in.*	2	23·0	1460	625
" "	**Jurien de la Gravière** shd.	5595	440	43½	22	17,000 Guyot	Lorient . .	1899	1901	475,979	3	..	8 *6·4-in.*, 12 *1·8-in.* . .	2	22·9 *t*	600 / 900	511
g. v. .	**Kersaint** . . shd.	1223	226	34½	15	2200	Rochefort .	1897	1898	107,933	..	..	1 *5·5-in.*, 5 *3·9-in.*, 7 *1·4-in.*	..	15·0	199	110
to. g. b.	**La Hire** . . .	889	256	27¾	12¾	7000 N.S.	Cherbourg .	1898	1899	123,383	..	..	6 *2·5-in.*, 6 *1·8-in.* . .	..	23·0	137	128
3rd cl. *cr*	**Lavoisier** . .	2285	330¼	34½	17¾	6400 B.	Rochefort .	1897	1899	202,024	1½	2 shield	4 *5·5-in.*, 2 *3·9-in.*, 8 *1·8-in.*, 2 *1·4-in.*, 4 M.	2	20·0	226	248
g. v. .	**Surprise** . . .	617	184¾	24½	12¼	853 *t.*	Havre . .	1895	1896	50,954	..	..	2 *3·9-in.*, 4 *2·5-in.*, 4 *1.4-in.*	..	13·4 *t*	73	99
g. v. .	**Zélée** . . .	554	185½	26	10½	1000 Nic.	Rochefort .	1899	1900	..	..	..	2 *3·9-in.*, 4 *2·5-in.*, 4 *1·4-in.*	..	13·0	80	75

Two cruiser-scouts, 6000 tons, and three of a new class, *conducteurs d'escadrilles*, 4500 tons, are to be built. In addition are the cruisers Bruix, 4735 tons, Charner, 4702 tons, and Cosmao, Forbin and Surcouf, 1950 tons (1888-1895); also several gun vessels and river gunboats.

Mine-layers Pluton and Cerbère, 560 tons, 6000 I.H.P., 20 knots; another to be laid down, 1914. Converted mining vessels, Cassini, 966 tons; Casabianca, 974 tons; Flamberge, 300 tons. Gunboat Balny, 214 tons; another provided for. Eight converted mine sweepers. Foudre, 5984 tons, depôt ship for balloons and aeroplanes.

MERCHANT AUXILIARY CRUISERS.—La France, 22,500 register tons, 23½ knots, Touraine, 8429 register tons, 19·5 knots, Lorraine, 11,869 register tons, 21 knots, Savoie, 11,200 register tons, 22½ knots, and Provence, 13,750 register tons, 22 knots, of the Compagnie Générale Transatlantique, are, under contract, auxiliary cruisers of the Navy in case of war, as well as some other vessels; also the Amazone, Magellan, Tonkin, and other 17 and 17½ knot boats of the Messageries Maritimes, and the Burdigala, 18 knots, and Lutetia, 20·5 knots, of the Sud Atlantique line.

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GERMANY.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Secondary.	Armament. Guns	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
a. c.	**Blücher**	15,550	499	80¼	..	43,886 *t.*	Kiel	1908	1910	1,250,000	6 K.S.	..	6 K.S.	..	6 K.S.	6 K.S.	12 *8·2-in.*, 8 *5·9-in.*, 16 *3·4-in.*, 3 L.	4 (2 sub.)	25·3 *t*	900 2300	888
b.	**Braunschweig**	12,997	398½	73½	24½	16,000 T.S. & C.	Germania	1902	1904	1,157,500	9–4 K.S.	3	6 K.S.	6 K.S.	10–6 K.S.	6 K.S.	4 *11-in.*, 14 *6·7-in.*, 18 *3·4-in.*, 4 M.	6 (sub.)	18·0	700 1600†	660
b. cr.	**Derfflinger***	28,000	700	96	27	100,000 (P. tur.)	Hamburg (Blohm & Voss)	1913	..	..	7 K.S.	..	..	..	10 K.S.	..	8 *12-in.*, 12 *5·9-in.*, 12 *3·4-in.*	4	27·0	..	..
b.	**Deutschland**	13,040	398½	72¾	24½	16,939 T.S. & C.	Germania	1904	1906	1,214,000	9½–4 K.S.	3	8 K.S.	6 K.S.	10–6 K.S.	6¾ K.S.	4 *11-in.*, 14 *6·7-in.*, 22 *3·4-in.*, 4 *1·4-in.*, 4 M.	6 (sub.)	18·5 *t*	700 1800†	736
b.	**Elsass**	12,997	398½	72¾	24½	16,812 W.T. & C.	Danzig (Schichau)	1903	1905	1,157,500	9–4 K.S.	3	6 K.S.	6 K.S.	10–6 K.S.	6 K.S.	4 *11-in.*, 14 *6·7-in.*, 18 *3·4-in.*, 4 M.	6 (sub.)	18·7	800 1600†	660
b.	**Friedrich der Grosse**	24,310	564¼	95¼	27¼	28,000 (A.E.G. tur.)	Hamburg (Vulcan)	1911	1912	..	13¾–5 K.S.	3	7 K.S.	..	12 K.S.	7 K.S.	10 *12-in.*, 14 *5·9-in.*, 12 *3·4-in.*, 4 L.	5	22·4 *t*	1000 3600	1073
a. c.	**Friedrich Karl**	8858	393½	65½	24	17,760 Dürr.	Hamburg (Blohm & Voss)	1902	1904	875,000	4 K.S.	2	6 K.S.	4 K.S.	6 K.S.	4 K.S.	4 *8·2-in.*, 10 *5·9-in.*, 12 *3·4-in.*, 3 *1·4-in.*	4 (sub.)	20·5 *t*	950 1500†	504
„	**Fürst Bismarck**	10,520	393½	66½	26	14,000 Dürr.	Kiel	1897	1900	..	7¾ K.S.	3	..	..	7¾ K.S.	4 K.S.	4 *9·4-in.*, 12 *5·9-in.*, 10 *3·4-in.*, 3 *1·4-in.*, 8 M.	6 (5 sub.)	19·0	1000†	565
„	**Gneisenau**	11,420	449½	70¾	24½	28,806 T.S.	Bremen (Weser)	1906	1908	..	6–3 K.S.	2	6–4¾ K.S.	..	6¾ K.S.	6 K.S.	8 *8·2-in.*, 6 *5·9-in.*, 20 *3·4-in.*, 14 smaller.	4 (sub.)	23·8 *t*	800† 2000	764
b. cr.	**Goeben**	22,640	610¼	96	27	70,000 (P. tur.)	Hamburg (Blohm & Voss)	1911	1912	..	7½–4 K.S.	..	..	..	8 K.S.	5 K.S.	10 *11-in.*, 12 *5·9-in.*, 12 *3·4-in.*	4	28·6 *t*	1000 3100	1013
b.	**Grosser Kurfürst**	26,575	580	97	27¼	35,000 T.S.	Hamburg (Vulcan)	1913	..	..	14–6 K.S.	3	8 K.S.	..	14 K.S.	..	10 *12-in.*, 14 *5·9-in.*, 12 *3-pr.*	5	23·0	1500 3000†	1150
b.	**Hannover**	13,040	398½	73¾	25¼	22,492 T.S. *t.*	Wilhelmshaven	1905	1907	1,157,500	9½–4 K.S.	3	8 K.S.	6 K.S.	10–6 K.S.	6¾ K.S.	4 *11-in.*, 14 *6·7-in.*, 20 *3·4-in.*, 4 *1·4-in.*, 4 M.	6 (sub.)	19·16 *t*	700 1800†	736
b.	**Helgoland**	22,500	546	93½	26½	28,000	Kiel (Howaldt)	1909	1911	..	11¾–4 K.S.	..	..	..	11 K.S.	6 K.S.	12 *12-in.*, 14 *5·9-in.*, 14 *3·4-in.*, 4 L.	6 (sub.)	20·5	900 3000	1107
b. cr.	**Hertha (Ersatz)**	28,000	700	96	27	100,000 (P. tur.)	Wilhelmshaven	Bldg.	..	..	7 K.S.	..	..	..	10 K.S.	..	8 *12-in.*, 12 *5·9-in.*, 12 *3·4-in.*	4	27·0	..	..
b.	**Hessen**	12,997	398½	73¾	24½	16,000 T.S. & C.	Kiel (Germania)	1903	1905	1,157,500	9–4 K.S.	3	6 K.S.	6 K.S.	10–6 K.S.	6 K.S.	4 *11-in.*, 14 *6·7-in.*, 18 *3·4-in.*, 4 M.	6 (sub.)	18·0	800 1600†	660
b.	**Kaiser**	24,310	564¼	27¼	27¼	28,000 (P. tur.)	Kiel	1911	1912	..	13¾–5 K.S.	3	7 K.S.	..	12 K.S.	7 K.S.	10 *12-in.*, 14 *5·9-in.*, 12 *3·4-in.*, 4 L.	5 (sub.)	23·6 *t*	1000 3600	1073

* Dimensions doubtful. † Also liquid fuel. ‡ Exclusive of armament.

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GERMANY.—Armoured Ships—*continued.*

Class	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Secondary.	Armament. Guns.	Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			kts.	tons.	
b.	Kaiser Barbarossa					13,000 C.&T.	Danzig	1900	1901 1907	962,500	11¾ H. N. S.	3	..	..	9¾ H. N. S.	6 H.N.S.	4 *9·4-in.*, 14 *5·9-in.*, 12 *3·4-in.*, 12 *1·4-in.*, 8 M.	5 (sub.)	18·0	650 1050+	700
b.	Kaiser Friedrich III.					13,000 C.&T.	Wilhelmshaven	1896	1899												
b.	Kaiser Wilhelm II.	10,474	377¼	66¾	25½	13,000 C.&T.S.	Wilhelmshaven	1897	1900	962,500	11¾ H. N. S.	3	..	..	9¾ H. N. S.	6 H.N.S.	4 *9·4-in.*, 18 *5·9-in.*, 12 *3·4-in.*, 12 *1·4-in.*, 8 M.	5 (sub.)	18·0	650 1050+	700
b.	Kaiser Wilhelm der Grosse					13,000 C.&T.S.	Germania	1899	1901												
b.	Kaiser Karl der Grosse					13,000 C.&T.S.	Hamburg (Blohm & Voss)	1899	1902												
b.	Kaiserin	24,310	564¼	95¼	27¼	28,000 (tur.)	Kiel (Howaldt)	1911	1913	..	13¾–5 K.S.	3	7 K.S.	..	12 K.S.	7 K.S.	10 *12-in.*, 14 *5·9-in.*, 12 *3·4-in.*, 4 L.	5 (sub.)	21·0	1000 3600	1073
b.	Konig	26,575	580	97	27¼	35,000 T.S.	Wilhelmshaven	1913	..	2,500,000	14–6 K.S.	3	8 K.S.	..	14 K.S.	..	10 *12-in.*, 14 *5·9-in.*, 12 *3-pr.*, 2 M.	5	23·0	1,500 3000+	1150
b.	König Albert	24,310	564¼	95¼	27¼	28,000 Schichau T.	Danzig (Schichau)	1912	1913	..	13¾–5 K.S.	3	7 K.S.	..	12 K.S.	7 K.S.	10 *12-in.*, 14 *5·9-in.*, 12 *3·4-in.*	5 (sub.)	21·0	1000 3600	1073
b.	Kronprinz	26,675	580	97	27¼	35,000	Kiel (Germania)	1914	..	2,500,000	14–6 K.S.	3	8 K.S.	..	14 K.S.	..	10 *12-in.*, 14 *5·9-in.*, 12 *3-pr.*, 2 M.	5	23·0	1500 3000+	1150
b.	Lothringen	12,997	398½	73¾	21½	16,950 W.T.&C.	Schichau (Danzig)	1904	1906	1,157,500	9–4 K.S.	3	6 K.S.	6 K.S.	10–6 K.S.	6 K.S.	4 *11-in.*, 14 *6·7-in.*, 18 *3·4-in.*, 4 M.	6 (sub.)	18·54 *t*	800 1600+	600
b. cr.	Lützow*	28,000	700	96	27	100,000 P.T.	Danzig (Schichau)	1913	..	..	7 K.S.	..	..	..	10 K.S.	..	8 *12-in.*, 12 *5·9-in.*, 12 *3·4 in.*	4	27·0	..	..
b.	Markgraf	26,575	580	97	27¼	35,000 T.S.	Bremen (Weser)	1913	..	2,500,000	14–6 K.S.	3	8 K.S.	..	14 K.S.	..	10 *12 in.*, 14 *5·9-in.*, 12 *3-pr.*, 2 M.	5	23·0	1,500 3000+	1150
b.	Mecklenburg	11,611	393¾	68¼	24¾	14,000 C.T.&S.	Stettin (Vulcan)	1901	1903	1,061,250	9–4 K.S.	3	5½ K.S.	6 K.S.	10 K.S.	6 K.S.	4 *9·4-in.*, 18 *5·9-in.*, 12 *3·4-in.*, 12 *1·4-in.*, 8 M.	6 (sub.)	18·1 *t*	700 1450+	715
b. cr.	Moltke	22,610	610¼	96	27	86,900*t* (P. tur.)	Hamburg (Blohm & Voss)	1910	1911	..	7½–4 K.S.	..	..	..	8 K.S.	5 K.S.	10 *11-in.*, 12 *5·9-in.*, 12 *3·4-in.*	4 (sub.)	28·4 *t*	1000 3100	1013
	Nassau	18,600	452	89	26½	25,800	Wilhelmshaven	1908	1909	1,825,000	11¾–4 K.S.	..	..	..	12 K.S.	..	12 *11-in.*, 12 *5·9-in.*, 16 *3·4-in.*, 4 l.	6 (sub.)	20·7 *t*	950 2700	961
b.	Oldenburg	22,500	546	93½	26½	28,000	Danzig (Schichau)	1910	1912	..	11¾–4 K.S.	..	..	..	11 K.S.	6 K.S.	12 *12-in.*, 14 *5·9-in.*, 14 *3·4-in.*, 4 l.	6 (sub.)	22·2 *t*	900 3000	1107

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b.	**Ostfriesland**	22,500	546	93½	26½	31,000	Wilhelmshaven	1909	1911	..	11¾-4 K.S.	..	..	..	11 K.S.	6 K.S.	12 12-in., 14 5·9-in., 14 3·4-in., 4 l.	6 (sub.)	22·2 t	900 3000	1107
b.	**Pommern**	13,040	398½	72¾	25¼	20,400 T.S. t.	Stettin (Vulcan)	1905	1907	1,214,000	9½-4 K.S.	3	8 K.S.	6 K.S.	10-6 K.S.	6¾ K.S.	4 11-in., 14 6·7-in., 20 3·4-in., 4 1·4-in., 4 M.	6 (sub.)	19·21 t	700 1800†	736
b.	**Posen**	18,600	452	89	26½	25,000	Kiel (Germania)	1908	1910	1,825,000	11¾-4 K.S.	..	..	..	12 K.S.	..	12 11-in., 12 5·9 in., 16 3·4-in., 4 l.	6 (sub.)	20·5	950 2700	961
b.	**Preussen**	12,997	389½	73¾	24½	18,374 W.T.& C.	Stettin	1903	1905	1,157,500	9-4 K.S.	3	6 K.S.	6 K.S.	10-6 K.S.	6 K.S.	4 11-in., 14 6·7-in., 12 3·4-in., 12 1·4-in. & 8 M.	6 (sub.)	18·6 t	800 1600†	660
a. c.	**Prinz Adalbert**	8858	393½	65½	24	17,660 Dürr.	Kiel	1901	1903	885,000	4 K.S.	1½	3 K.S.	3 K.S.	6 K.S.	4 K.S.	4 8·2-in., 10 5·9-in., 12 3·4-in., 3 1·4-in., 4 M.	4 (3sub.)	20·3	950 1500†	504
a. c.	**Prinz Heinrich**	8759	396	64¼	25¼	15,700 Dürr.	Kiel	1900	1902	730,000	4 K.S.	2½	4 K.S.	..	6 K.S.	4 K.S.	2 9·4-in., 10 5·9-in., 10 3·4-in., 3 1·4-in., 4 M.	4 (3sub.)	20·0	950	528
b.	**Prinz-Regent Luitpold**	24,310	564½	95¼	27¼	28,000 (P. tur.)	Kiel (Germania)	1912	1913	..	13¾-5 K.S.	3	7 K.S.	..	12 K.S.	5 K.S.	10 12-in., 14 5·9-in., 12 3·4-in., 4 l.	5 (sub.)	21·0	1000 3600	1073
b.	**Rheinland**	18,600	452	89	26½	25,000	Stettin (Vulcan)	1908	1910	1,825,000	11¾-4 K.S.	..	..	..	12 K.S.	..	12 11-in., 12 5·9-in., 16 3·4-in., 4 l.	6 (sub.)	20·0	950 2700	961
a. c.	**Roon**	9350	403¼	65½	24	20,625 Dürr.	Kiel	1903	1905	875,000	4-3 K.S.	2¾	6 K.S.	4 K.S.	6 K.S.	4 K.S.	4 8·2-in., 10 5·9-in., 14 3·4-in., 3 1·4-in.	4 (sub.)	21·17	750 1800†	638
a. c.	**Scharnhorst**	11,420	449½	70¾	24½	27,759 T.S.	Hamburg (Blohm&Voss)	1906	1908	..	6-3 K.S.	2	6-4¾ K.S.	..	6¾ K.S.	4 K.S.	8 8·2-in., 6 5·9-in., 20 3·4-in., 14 smaller	4	22·5	800† 2000	764
b.	**Schlesien**	13,040	398½	72¾	25¼	16,939 T.S. & C.	Schichau	1906	1908	1,214,000	9½-4 K.S.	3	8 K.S.	6 K.S.	11-6 K.S.	6¾ K.S.	4 11-in., 14 6·7-in., 20 3·4-in., 4 1·4, 4 M.	6 (sub.)	19·2	700 1800†	736
b.	**Schleswig-Holstein**						Germania												19·5 t		
b.	**Schwaben**	11,611	393¾	68¼	24¾	14,000 C.&T.S.	Wilhelmshaven	1901	1903	1,061,250	9-4 K.S.	3	5½ K.S.	6 K.S.	10-6 K.S.	6 K.S.	4 9·4-in., 18 5·9-in., 12 3·4-in., 12 1·4-in., 8 M.	6 (5sub.)	18·0	700 1450†	715
b. cr.	**Seydlitz**	24,640	656	93½	27	100,000 t. (P.T.)	Hamburg (Blohm&Voss)	1912	1913	..	11-4 K.S.	2	7 K.S.	8½ K.S.	11 K.S.	7½ K.S.	10 11-in., 12 5·9-in., 12 3·4-in.	4	29·2 t	1100 3600	..
b.	**T.***	..	..	..	..	..	Kiel (Howaldt)	Bldg.	..	..	..	..	..	..	..	..	8 15-in., 16 5·9-in., many 3·4-in.	..	..	..	..
b.	**Thüringen**	22,500	546	93½	26½	34,000 t. (tur)	Bremen (Weser)	1909	1911	..	11¾-4 K.S.	..	..	..	11 K.S.	6 K.S.	12 12-in., 14 5·9-in., 14 3·4-in., 4 l.	6	21·07 t	900 3000	1107
b. cr.	**Von der Tann**	18,700	561	87	26½	71,500 t. (P.tur.)	Hamburg (Blohm&Voss)	1909	1911	1,833,000	6 K.S.	..	..	..	..	6 K.S.	8 11-in., 10 5·9-in., 16 3·4-in.	4	27·6 t	1000 2800	910
b.	**Westfalen**	18,600	452	89	26½	26,792 (t.)	Bremen (Weser)	1908	1909	1,825,000	11¾-4	..	..	..	12	..	12 11-in., 12 5·9-in., 16 3·4-in., 4 l.	6 (sub.)	20·2 t	950 2700	961
b.	**Wettin**	11,611	393¾	68¼	24¾	14,000 C.&T.S.	Schichau	1901	1902	1,071,250	9-4 K.S.	3	5½ K.S.	6 K.S.	10 K.S.	6 K.S.	4 9·4-in., 18 5·9-in., 12 3·4-in., 12 1·4-in., 8 M.	6 (sub.)	18·0	700 1450†	715
b.	**Wittelsbach**						Wilhelmshaven	1900	1902	1,071,250											
b.	**Wörth** (Ersatz)*	..	..	..	..	..	Danzig (Schichau)	Bldg.	..	..	..	..	..	..	..	..	8 15-in., 16 5·9-in., many 3·4-in.	..	..	..	..
a. c.	**Yorck**	9350	403¼	65½	24	20,290 Dürr.	Hamburg (Blohm&Voss)	1904	1905	875,000	4-3 K.S.	2	6 K.S.	4 K.S.	6 K.S.	4 K.S.	4 8·2-in., 10 5·9-in., 14 3·4-in., 3 1·4-in.	4 (sub.)	21·1 t	750 1600†	638
b.	**Zähringen**	11,611	393¾	68¼	24¾	15,000 T.S.	Kiel (Germania)	1901	1902	1,071,250	9-4 K.S.	3	5½ K.S.	6 K.S.	10 K.S.	6 K.S.	4 9·4-in., 18 5·9-in., 12 3·4-in., 12 1·4-in., 8 M.	6 (sub.)	19·0	650 1000†	715

* Particulars doubtful or not known.

† Also liquid fuel.

The programme for 1914 includes a battleship to replace the Kaiser Friedrich III., also a battle-cruiser nominally to replace the protected cruiser Victoria Luise.
There are also the old battleships Brandenburg and Wörth, 9874 tons (1891-92). The following coast-defence armourclads, 4000 tons, launched 1889-95, are still retained on the list: Siegfried, Beowulf, Frithjof, Hildebrand, Heimdall, Hagen, Odin, Aegir.

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GERMANY.—Cruising Ships.

Class.	NAME.		Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
			tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
3rd cl. *cr.*	**Amazone**	shd.	2618	328	38½	16	8000 T.S.	Kiel (Germania)	1900	1901	247,000	2	..	10 *4·1-in.*, 14 M.	2 (sub.)	21·5 *t*	560	275
„ „	**Arcona**	shd.	2657	328	38½	16	8000 T.S.	Bremen (Weser)	1902	1903	254,500	2	..	10 *4·1-in.*, 14 M.	2 (sub.)	21·0	700	281
„ „	**Ariadne**	shd.	2618	328	38½	16	8000 T.S.	Bremen (Weser)	1900	1901	247,000	2	..	10 *4·1-in.*, 14 M.	2 (sub.)	22·0	560	275
„ „	**Augsburg**		4280	401¾	46	16½	20,000 (tur.)	Kiel	1909	1910	..	2	..	12 *4·1-in.*, 4 *2·1-in.*, 4 M.	2 (sub.)	27·0	400 900	379
„ „	**Berlin.**	shd.	3200	341	43¼	16½	11,000 T.S.	Danzig	1903	1905	254,500	2	..	10 *4·1-in.*, 14 M.	2 (sub.)	23·2 *t*	800	303
„ „	**Bremen**		3200	341	43¼	16½	10,000 T.S.	Bremen (Weser)	1903	1904	254,500	2	..	10 *4·1-in.*, 14 M.	2 (sub.)	23·0	800	303
„ „	**Breslau**		4500	446¼	44½	16¾	33,482 A.E.G.t.	Stettin (Vulcan)	1911	1912	..	2	(4–2½ side)	12 *4·1-in.*, 2 M.	2 (sub.)	27·5 *t*	1200	373
„ „	**Danzig**		3200	341	43¼	16½	10,000 T.S.	Danzig	1905	1907	254,500	2	..	10 *4·1-in.*, 14 M.	2 (sub.)	23·0	800	303
„ „	**Dresden**		3544	364	44¼	15¾	15,000 (tur.)	Hamburg	1907	1908	..	2	..	12 *4·1-in.*, 4 *2·1-in.*, 4 M.	2 (sub.)	27·0	400 850	361
g.b.	**Eber**		977	206¾	30¼	10¾	1300 T.S.	Danzig	1903	1904	91,000	..	..	8 *3·4-in.*, 6 *1·4-in.*, 2 M.	..	13·0	240	130
3rd cl. *cr.*	**Emden**		3544	364	44¼	15¾	15,000 (tur.)	Danzig	1908	1909	..	2	..	10 *4·1-in.*, 4 *2·1-in.*, 4 M.	2 (sub.)	25·0	400 850	361
„ „	**Frauenlob**	shd.	2657	328	38½	16	8000 T.S.	Bremen (Weser)	1902	1904	254,500	2	..	10 *4·1-in.*, 14 M.	2 (sub.)	21·0	700	281
2nd cl. *cr.*	**Freya** (training)		5569	344½	57	20¾	10,000 Nic.	Danzig	1897	1898	..	4 N.S.	4 N.S.	2 *8·2-in.*, 6 *5·9-in.*, 14 *3·4-in.*, 4 M.	3 (sub.)	19·5 *t*	825	268
3rd cl. *cr.*	**Gazelle**	shd.	2603	328	38½	16¾	6400 Nic.	Kiel (Germania)	1898	1898	225,000	2	..	10 *4·1-in.*, 14 M.	3 (1 sub.)	18·0	560	636
„ „	**Geflon**		3705	344½	42¾	20¾	9000	Danzig (Schichau)	1893	1894	..	1¼	..	10 *4·1-in.*, 6 *2·1-in.*, 4 M.	2	19·0	780	296
..	Geflon (Ersatz)*		5000	..	..	..	45,000	Stettin (Vulcan)	Bldg.	..	..	..	..	..	..	..	..	..
3rd cl. *cr.*	**Graudenz***		5000	456	45	17	30,000 P.T.	Kiel (Germania)	1913	1913	..	2	(4–2½ side)	12 *4·1-in.*, 2 M.	2 (sub.)	27·5	1400	373

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3rd cl. *cr.*	**Hamburg**	shd.	3200	341	43¼	16½	11,500 T.S.	Stettin (Vulcan)	1903	1904	254,500	2	..	10 *4·1-in.*, 14 M.	2 (sub.)	23·28 *t*	800	303
2nd cl. *cr.*	**Hansa** (training)	shd.	5791	345½	57¾	21¾	10,000 B.	Stettin (Vulcan)	1898	1899	..	4 N.S.	4 N.S.	2 *8·2-in.*, 8 *5·9-in.*, 10 *3·4-in.*, 4 M.	3 (sub.)	19·5	825	636
3rd cl. *cr.*	**Hela** (Ersatz)*		..	..	..	..	45,000	Kiel	Bldg.	..	..	..	..	..	..	..	..	..
2nd cl *cr.*	**Hertha** (training)		5569	344½	57	21¾	10,000 B.	Stettin (Vulcan)	1897	1898	..	4 N.S.	4	2 *8·2-in.*, 6 *5·9-in.*, 14 *3·4-in.*, 4 M.	3 (sub.)	19·5 *t*	825	636
g. b.	**Iltis**	shd.	881	203½	29¾	10¾	1300 T.	Danzig (Schichau)	1898	1898	100,000	..	..	8 *3·4-in.*, 6 *1·4-in.*, 2 M.	..	13·5 *t*	165	126
b.	**Jaguar**	shd.	900	203½	29¾	10¾	1300 T.	Danzig (Schichau)	1898	1899	90,000	..	..	8 *3·4-in.* 6 *1·4-in.*, 2 M.	..	13·5 *t*	165	126
2nd cl. *cr.*	**Kaiserin Augusta**	shd.	5956	387	52½	23	14,000	Kiel (Germania)	1892	1896	..	3½	..	12 *5·9-in.*, 8 *3·4-in.*, 4 M.	3 (1 sub.)	21·0	850	439
3rd ,,	**Karlsruhe**		4820	456	45	17	26,000 P.T.	Kiel (Germania)	1912	1913	..	2	(4–2½ side)	12 *4·1-in*, 2 M.	2 (sub.)	27·0	1400	373
,, ,,	**Kolberg**		4232	388¼	46	16½	20,000 (tur.)	Danzig (Schichau)	1908	1910	..	2	..	12 *4·1-in.*, 4 *2·1-in.*, 4 M.	2 (sub.)	25·5	400 900	379
,, ,,	**Köln**		4280	401¾	46	16½	20,000 (tur.)	Kiel (Germania)	1909	1910	..	2	..	12 *4·1-in.*, 4 *2·1-in.*, 4 M	4 (sub.)	27·2 *t*	400 900	379
,, ,,	**Königsberg**		3350	354¼	43½	15¾	13,200 T.S.	Kiel	1906	1907	..	2	..	10 *4·1-in.*, 8 *2·1-in.*, 4 M.	2 (sub.)	23·5	400 850	322
,, ,,	**Leipzig**		3200	341	43¼	16½	11,000	Bremen (Weser)	1905	1906	254,500	2	..	10 *4·1-in.*, 14 M.	2 (sub.)	23·0	800	303
,, ,,	**Lübeck**		3200	341	43¼	16½	14,000 T.S. tur.	Stettin (Vulcan)	1904	1906	254,500	2	..	10 *4·1-in.*, 14 M.	2 (sub.)	23·0	800	303
g. b.	**Luchs**		962	206¾	30¼	10¾	1300 T.S.	Danzig	1899	1900	91,000	2	..	8 *3·4-in.*, 6 *1·4-in.*, 2 M.	..	13·5 *t*	240	126
3rd cl. *cr.*	**Magdeburg**		4500	446¼	44½	16¾	29,904 Berg. t.	Bremen (Weser)	1911	1912	..	2	(4–2½ side)	12 *4·1-in.*, 2 M.	2 (sub.)	27·6 *t*	1200	373
,, ,,	**Mainz**		4232	388¼	46	16½	20,000 (tur.)	Stettin (Vulcan)	1909	1910	..	2	..	12 *4·1-in.*, 4 *2·1 in.*, 4 M	2 (sub.)	28·0 *t*	400 900	379
,, ,,	**Medusa**	shd.	2618	328	38½	16	8000 T.S.	Bremen (Weser)	1900	1901	247,000	2	..	10 *4·1-in.*, 14 M.	2 (sub.)	22·0	560	275
,, ,,	**München**	shd.	3200	341	43¼	16½	11,000 T.S.	Bremen (Weser)	1904	1905	254,500	2	..	10 *4·1-in.*, 14 M.	2 (sub.)	23·4 *t*	800	303
,, ,,	**Niobe**	shd.	2603	328	38½	15	8000 T.S.	Bremen (Weser)	1899	1901	217,500	2	..	10 *4·1-in.*, 14 M.	2 (sub.)	20·0	560	275
,, ,,	**Nymphe**	shd.	2618	328	38½	15	8000 T.S.	Kiel (Germania)	1899	1901	217,500							
3rd cl. *cr.*	**Nürnberg**		3396	354¼	43½	15¾	13,200 T.S.	Kiel	1906	1908	..	2	..	10 *4·1-in.*, 8 *2·1-in.*, 4 M.	2 (sub.)	23·5	400 850	322
g. b.	**Panther**		962	206¾	30¼	10¾	1300 T.S.	Danzig	1901	1902	91,000	..	..	8 *3·4-in.*, 6 *1·4-in.*, 2 M.	..	13·5 *t*	240	130

* Particulars unknown or doubtful.

GERMANY.—Cruising Ships—*continued*.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			kts	tons.	
3rd cl. *cr.*	**Regensburg** * . shd.	5000	456	45	17	30,000 P.T.	Bremen (Weser)	1912	1914	..	2	(4–2½ side)	12 *4·1-in.*, 2 M.	2 (sub.)	27·0	1400	373
„ „	**Rostock**	4820	456	45	17	26,000 P.T.	Kiel (Howaldt)	1912	1913	..	2	(4–2½ side)	12 *4·1-in.*, 2 M.	2 (sub.)	29·2 *t*	1400	373
„ „	**Stettin**	3396	354¼	43½	15¾	13,200 T.S. tur.	Stettin (Vulcan)	1907	1907	..	2	..	10 *4·1-in.*, 8 *2·1-in.*, 4 M.	2 (sub.)	23·5	400 850	322
„ „	**Strassburg**	4500	446¼	41½	16¾	22,300 P. tur.	Wilhelmshaven	1911	1912	..	2	(4–2½ side)	12 *4·1-in.*, 2 M.	2 (sub.)	27·0	1200	373
„ „	**Stralsund**	4500	446¼	44½	16¾	23,000 Berg. t.	Bremen (Weser)	1911	1912	..	2	(4–2½ side)	12 *4·1-in.*, 2 M.	2 (sub.)	28·3 *t*	1200	373
„ „	**Stuttgart**	3396	354¼	43½	15¾	13,200 T.S. tur.	Kiel	1906	1908	..	2	..	10 *4·1-in.*, 8 *2·1-in.*, 4 M.	2 (sub.)	23·3 *t*	400 850	322
„ „	**Thetis** . shd.	2618	344½	38½	16	8000 T.S.	Danzig	1900	1901	247,000	2	..	10 *4·1-in.*, 14 M.	2 (sub.)	21·8 *t*	560	275
g. b.	**Tiger**	962	203½	29¾	10	1300 T.S.	Danzig	1899	1900	..	..	..	8 *3·4-in.*, 6 *1·4-in.*, 2 M.	..	13·5 *t*	240	126
3rd cl. *cr.*	**Undine** . shd.	2657	328	38½	13	8000 T.S.	Kiel (Howaldt)	1902	1904	254,500	2	..	10 *4·1-in.*, 14 M.	2 (sub.)	21·0	700	281
2nd cl. *cr.*	**Victoria Luise** (trng.)	5569	344½	57	21¾	10,000 Dürr.	Bremen (Weser)	1897	1898	..	4 H.S.	4 H.S.	2 *8·2-in.*, 6 *5·9-in.*, 14 *3·4-in.*, 4 M.	3 (sub.)	19·5 *t*	825	465
„ „	**Vineta** (training)	5791	345½	57¾	21¾	10,000 Dürr.	Danzig	1897	1899	..	4 H.S.	4 H.S.	2 *8·2-in.*, 8 *5·9-in.*, 10 *3·4-in.*, 4 M.	3 (sub)	19·5 *t*	825	465

* Particulars doubtful.

The 1914 programme includes cruisers to replace the Gazelle and Niobe.

The Imperial Yacht **Hohenzollern**, 4187 tons, 9460 I.H.P., 22 knots, carries 3 4·1-in., 12 1·9-in. Q.F. and 4 M. A new Imperial yacht is in hand. Cruisers **Seeadler, Kormoran, Kondor** and **Geier** (1550–1620 tons), 1892–94. River gunboats for China, the **Tsingtau, Vaterland, Vorwärtz** (168 tons), **Otter** (270 tons). The mining vessels **Nautilus** and **Albatross** (2000 tons), **Pelikan** (2215 tons). Gunboat "C" in hand at Danzig, 1150 tons, 14 knots, 4 4·2-in., 4 M. Gunnery tenders **Drache** and **Delphin**, 765 tons, 15 knots. Submarine salvage vessel **Vulkan**; another begun in 1912.

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Merchant Cruisers (Auxiliaries to the German Navy).

To wha Company belonging.	Name of Ship.	Register Tonnage.	Length.		Beam.		Draught of Water.		Indicated H.P.	Ocean Speed.	When Built.	Armament.
		tons.	ft.	in.	ft.	in.	ft.	in.		knots.		
North German Lloyd	Kronprinzessin Caecilie .	19,500	678	0	72	0	29	0	45,000	23½	1906	The armament is of 6-in. and smaller quick-firers.
	Kaiser Wilhelm II. . .	19,500	678	0	72	0	29	0	45,000	23½	1901	
	Kronprinz Wilhelm .	14,800	640	0	66	0	26	3	30,000	23	1901	
	Kaiser Wilhelm der Grosse	14, 349	625	0	66	0	27	0	30,000	23	1897	
	George Washington . .	26,000	..		..		..		20,000	19	1908	

The Hamburg-Amerika liner Imperator is classified as an auxiliary cruiser. Many other vessels of less than 19 knots speed are in the list, including the Prinz Friedrich Wilhelm (16,900 register tons) and the Berlin (17,000 register tons), 18 knots.

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GREECE.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Second-ary.	Armament. Guns.	Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
a c.	**Giorgios Averoff**	9956	429¾	68¾	24¾	20,000 B	Leghorn (Orlando)	1910	1911	1,100,000	8–3½ K S.	1¾	7	7	7–6	..	4 *9·2-in.*, 8 *7·5-in.*, 16 *3in.*, 8 *1·8-in.*	3 (sub.)	24·0	700 1600	..
b.	**Hydra** . . .	4808	334½	51¾	23¼	7000	St. Nazaire La Seyne .	1889	1891 1900	..	11¾–4	2½	3	..	13½	..	3 *10·6-in.* Canet, 5 *5·9-in.*, 1 *3·9-in.*, 8 *2·5-in.*, 4 *1·8-in.*, 12 *1·4-in.*	3	17·0	600	400
,,	**Psara** . . .	4808	334½	51¾	23¼	7000	Havre . . La Seyne .	1890	1892 1897	..	11¾–4	2½	3	..	13½	..					
b. cr.	**Salamis** . .	19,200	571	82	25¼	40,000 (tur.)	Stettin (Vulcan)	Bldg	..	1,240,000	10 K S.	2½	7 K.S.	..	10 K.S.	7 K.S.	8 *14-in.*, 12 *6-in.*, 12 *12-pr.*	4 (sub.)	23	..	..
b.	**Spetsai** . .	4808	334½	51¾	23¼	7000	Havre . . La Seyne .	1889	1891 1900	..	11¾–4	2½	3	..	13½	..	3 *10·6-in.* Canet, 5 *5·9-in.*, 1 *3·9-in.*, 8 *2·5-in.*, 4 *1·8-in.*, 12 *1·4 in.*	3	17·0	600	400

GREECE.—Cruising Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
g.v.	**Acheloos** . . .	420	130	24½	11½	400	Blackwall .	1884	1885	..	..	..	2 *3·7-in.* (K.), 3 M. . .	..	10·0	50	..
,,	**Alphios** . . .	420	130	24½	11½	400	Blackwall .	1884	1885	..	..	..	2 *3·7-in.* (K.), 3 M. . .	..	10·0	50	..
,,	**Eurotas** . . .	420	130	24½	11½	400	Dumbarton .	1884	1885	..	..	..	2 *3·7-in.* (K.), 3 M. . .	..	10·0	50	..
corv.	**Sfaktirea** . . .	1000	216½	29¾	18	2400	England . .	1885	1886	..	..	..	2 *3·9-in.* (K.), 2 M. . .	..	14·5	100	..
cr.	**N** (*ex* Fei-Hung)	2600	330	42	13	6500 tur.	Camden, N.J. .	1912	1914	240,000	¾	..	2 *6-in.*, 4 *4-in.*, 2 *12-pr.*, 6 *3-pr.*	2	22·5	..	..

Torpedo depôt-ship.—**Kanaris, 1100 tons, 500 I.H.P., 2 3·9-in. (Krupp) guns, 14 knots speed.** Mine-layers Aigialla, Monemvassia, Nauplia.

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ITALY.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour: Belt.	Armour: Deck.	Armour: Side above Belt.	Armour: Bulkhead.	Armour: Gun Position: Heavy Guns.	Armour: Gun Position: Secondary.	Armament: Guns.	Armament: Torpedo Tubes.	Speed.	Coal	Complement.
		tons.	ft.	ft.	ft.					£	in	ins	ins.	ins.	ins.	ins.			knots.	tons.	
a.c.	**Amalfi**	9956	429¾	68¾	24¼	20,800 B.	Genoa (Odero)	1908	1909	880,000	8–3½ K.S.	1½	7 K.S.	7 K.S.	7–6 K.S.	..	4 *10-in.*, 8 *7·5-in.*, 16 *3-in.*, 2 M.	3 (sub.)	23·6 t	700 1500	687
b.	**Ammiraglio di St. Bon**	9645	344½	69¼	24¾	13,500	Venice	1897	1901	..	9¾–4 H.S.	3–1½	6 H.S.	6 H.S.	9¾ H.S.	6 H.S.	4 *10-in.*, 8 *6-in.*, 8 *4·7-in.*, 2 *2·9-in.*, 8 *2·2-in.*, 12 *1·4-in.*, 2 M.	4	18·3 t	600	548
b.	**Benedetto Brin**	13,214	426½	78¼	27¼	20,400 B.	Castellammare	1901	1905	..	6–2 H.S.	3	6 H.S.	8 H.S.	10 H.S.	6 H.S.	4 *12-in.*, 4 *8-in.*, 12 *6-in.*, 16 *3-in.*, 8 *1·8-in.*, 4 M.	4 (sub.)	19·5 t	1000 2000	811
a.c.	**Carlo Alberto**	6396	325	59	23	13,220 t	Spezia	1896	1898	..	6–4½ H.S.	1½	6 H.S.	..	6 H.S.	4½ shields	12 *6-in.*, 6 *4·7-in.*, 2 *2·9-in.*, 10 *2·2-in.*, 10 *1·4-in.*, 2 M.	4	19·2 t	1000	500
b.	**Conte di Cavour**	22,340	557	92	28	24,000 Parsons B. & W.	Spezia	1911	..	..	9½–4½ K.S.	1¾	6 K.S.	..	9½ K.S.	5 K.S.	13 *12-in.*, 18 *4·7-in.*, 14 *12-pr.*, 6 l. & M.	3 (sub.)	22·5	1000	999
b.	**Dante Alighieri**	19,400	505	85	27¼	35,000 t Parsons Bl.	Castellammare	1910	1912	..	9¼–4½ K.S.	1½	6 K.S.	..	10 K.S.	..	12 *12-in.*, 20 *4·7-in.*, 13 *12-pr.*	3 (2 sub.)	23·8 t	1000 2500	900
b.	**Doria** (Andrea) / **Duilio** (Caio)	23,025	570	91	29	24,000 P. tur. Y.	Spezia / Castellammare	1913 / 1913	..	..	10½–6 K.S.	1¾	6 K.S.	..	9½ K.S.	5 K.S.	13 *12-in.*, 16 *6-in.*, 14 *12-pr.*, 6 l. & M.	3 (sub.)	23	1000 2500	1000
b.	**Emanuele Filiberto**	9645	344½	69¼	24¾	13,500	Castellammare	1897	1901	..	9¾–4 H.S.	3–1	6 H.S.	6 H.S.	9¾ H.S.	6 H.S.	4 *10-in.*, 8 *6-in.*, 8 *4·7-in.*, 2 *2·9-in.*, 8 *2·2-in.*, 12 *1·4-in.*, 2 M.	4	18·3 t	600	536
a.c.	**Francesco Ferruccio**	7294	344	59¾	23¼	13,500 Nic.	Venice	1902	1904	..	6–3 H.S.	1½	6 H.S.	5 H.S.	6 H.S.	6 H.S.	1 *10-in.*, 2 *8-in.*, 14 *6-in.*, 10 *2·9-in.*, 6 *1·8-in.*, 2 M.	4 (sub.)	20·0	655 1200	540
b.	**G.***	28,000	670	98	..	48,000	..	Pro.	..	..	12 K.S.	..	..	..	..	..	8 *15-in.*, 20 *6-in.*, 20 *12-pr.*	..	25·0	Oil	1300
a.c.	**Giuseppe Garibaldi**	7294	344	59¾	23¼	14,713 t Nic.	Sestri-Ponente (Ansaldo)	1899	1901	..	6–3 H.S.	1½	6 H.S.	5 H.S.	6 H.S.	6 H.S.	1 *10-in.*, 2 *8-in.*, 14 *6-in.*, 10 *2·9-in.*, 6 *1·8-in.*, 2 M.	4 (sub.)	20·0	655 1200	540
b. / b.	**Giulio Cesare** / **Leonardo da Vinci**	22,340	557	92	28	34,000 P. B.&W. / P. Bl.	Sestri-Ponente (Ansaldo) / Genoa (Odero)	1911 / 1911	1914 / 1914	..	9½–4½ K.S.	1¾	6 K.S.	..	9½ K.S.	5 K.S.	13 *12-in.*, 18 *4·7-in.*, 14 *12-pr.*, 6 l. & M.	3 (sub.)	23·0 t	1000	999
a.c.	**Marco Polo**	4511	327	48¼	19½	10,543 t	Castellammare	1892	1894	344,400	4	1	4	4	4	..	6 *5·9-in.*, 4 *4·7-in.*, 6 *2·9-in.*, 2 *1·4-in.*, 2 M.	4	19·0 t	600	305

* Particulars uncertain. Three others projected. The names assigned to these ships are: Caracciolo (Castellammare), Cristoforo Colombo (Ansaldo), Marcantonio Colonna (Odero), and Francesco Morosini (Orlando).

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ITALY.—Armoured Ships—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Second-ary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			kts.	tons.	
b.	Napoli Regina Elena	12,425	435½	73½	27¼	20,000 B.&W 20,000 B.	Castellammare Spezia	1905 1904	1909 1907	1,120,000	9¾–4 H.S.	2	8 H.S.	8 H.S.	8 H.S.	6 H.S.	2 *12-in.*, 12 *8-in.*, 12 *3-in.*, 12 *1·8-in.*	2 (sub.)	22·0	1000 2000	711
a.c.	Pisa	9956	429¾	68¾	24¾	18,000 B.	Leghorn (Orlando)	1907	1909	..	8–3½ K.S.	1¾	7 K.S.	7 K.S.	7–6 K.S.	..	4 *10 in.*, 8 *7·5-in.*, 16 *3-in.*, 2 M.	3 (sub.)	23·0	700 1600	687
b.	Regina Margherita	13,214	426½	78¼	27¼	20,664 Nic.	Spezia	1901	1904	..	6 H.S.	3	6 H.S.	8 H.S.	8 H.S.	6 H.S.	4 *12-in.*, 4 *8-in.*, 12 *6-in.*, 16 *3-in.*, 8 *1·8-in.*, 4 M.	4 (sub.)	20·2 *t*	1000 2000	811
b.	Re Umberto	13,673	400	76¾	28½	19,500	Castellammare	1888	1893	1,058,500	4	3	4	2¾	18	..	4 *67-ton* (A.), 8 *6-in.*, 16 *4·7-in.*, 2 *9-in.*, 15 *2·2-in.*, 14 *1·4-in.*, 2 M.	5	19·0	1200	785
b.	Roma	12,425	435½	73½	27¼	20,000 B. & W.	Spezia	1907	1909	1,120,000	9¾–4 H.S.	2	8 H.S.	8 H.S.	8 H.S.	6 H.S.	2 *12-in.*, 12 *8-in.*, 12 *3-in.*, 12 *1·8-in.*	2 (sub.)	22·0	1000 2000	711
a.c.	San Giorgio San Marco	9832	429¾	68¾	24¾	18000 Bl. 18000 tur.	Castellammare	1908	1910	..	8–3½ K.S.	1¾	7 K.S.	7 K.S.	7–6 K.S.	7 K.S.	4 *10-in.*, 8 *7·5-in.*, 16 *3-in.*, 8 *1·8-in.*	3 (sub.)	22·5	700 1600	643
b.	Sardegna	13,640	411	76¾	28½	19,650 *t*	Spezia	1890	1895	1,057,440	4	3	4	2¾	14¼ comp.	..	4 *67-ton* (A.), 8 *5·9-in.*, 16 *4·7-in.*, 2 *2·9-in.*, 20 *2·2-in.*, 10 *1·4-in.*, 2 M.	5	20·1 *t*	1200	785
b.	Sicilia	13,087	400	76¾	28½	19,500	Venice	1891	1895	1,050,000	4	3	4	2¾	18 comp.	..	4 *67-ton* (A.), 8 *5·9-in.*, 16 *4·7-in.*, 2 *2·9-in.*, 20 *2·2-in.*, 10 *1·4-in.*, 2 M.	5	19·2 *t*	1200	785
a.c.	Varese	7294	344	59¾	23⅓	13,500 B.	Leghorn (Orlando)	1899	1901	..	6–4½ H.S.	1½	6 H.S.	5 H.S.	6 H.S.	6 H.S.	1 *10-in.*, 2 *8-in.*, 14 *6-in.*, 10 *2·9-in.*, 6 *1·8-in.*, 2 M.	4	20·0	650 1200	500
a.c.	Vettor Pisani	6396	325	59	23	13,000	Castellammare	1895	1897	..	6 H.S.	1½	6 H.S.	..	6 H.S.	4½ shields	12 *6-in.*, 6 *4·7-in.*, 2 *2·9-in.*, 10 *2·2-in.*, 10 *1·4-in.*, 2 M.	4	20·0	600	504
b.	Vittorio Emanuele III	12,425	435½	73½	27¼	20,000 B.	Castellammare	1904	1907	1,120,000	9¾–4 H.S.	2	8 H.S.	8 H.S.	8 H.S.	6 H.S.	2 *12-in.*, 12 *8-in.*, 12 *3-in.*, 12 *1·8-in.*	2 (sub.)	22·0	1000 2000	711

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ITALY.—Cruising Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armaments. Guns.	Armaments. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
to.cr.	**Agordat**	1292	287½	30½	11	8000	Castellammare	1899	1901	..	1	..	4 *4·7-in.*, 8 *2·2-in.*, 2 *1·4-in.*	2	22·0	160	158
to.g.b.	**Aretusa**	833	230	26¾	11¾	4420	Leghorn (Orlando)	1891	1892	72,920	1	..	1 *4·7-in.*, 6 *2·2-in.*, 3 *1·4-in.*	6	20·7 *t*	120	111
3rd cl. *cr.*	**Basilicata**	2460	..	..	..	4000	Castellammare	Bldg.	..	..	1	..	6 *6-in.*, 6 *12 pr.*, 2 *6-pr.*, 2 M.	..	16·5	500	..
„ „	**Campania**																
„ „	**Calabria**	2452	249¼	42	16¾	4094 *t*	Spezia	1894	1897	183,120	2	..	6 *4·7-in.*, 10 smaller	2	16·4 *t*	500	257
to.cr.	**Coatit**	1292	287½	30½	11	8160	Castellammare	1899	1901	..	1	..	4 *4·7-in.*, 8 *2·2-in.*, 2 *1·4-in.*	2	21·1 *t*	160	158
3rd cl. *cr.*	**Elba*** shd.	2689	272½	40¾	16½	7471 *t*	Castellammare	1893	1895	200,000	2	4½	6 *4·7-in.*, 4 *2·2-in.*, 2 *1·4-in.*, 1 M.	2	17·9 *t*	500	272
„ „	**Etruria**	2245	262½	39½	16½	7585 *t*	Leghorn (Orlando)	1891	1893	183,120	2	4½	4 *5·9-in.*, 6 *4·7-in.*, 1 *2·9-in.*, 8 *2·2-in.*, 10 *1·4-in.*, 2 M.	2	19·84 *t*	400	257
g.v.	**Governolo**	1235	185	33¾	13¾	1100	Venice	1894	1896	58,440	..	..	4 *4·7-in.*, 4 *2·2-in.*, 2 *1·4-in.*, 2 M.	..	13·0	200	131
to.g.b.	**Iride**	931	229½	27	10¼	4243	Castellammare	1891	1892	72,920	1	..	1 *4·7-in.*, 6 *2·2-in.*, 3 *1·4-in.*	6	19·6 *t*	120	111
3rd *cl. cr.*	**Libia**	3690	311½	47	..	12,500	Genoa (Ansaldo)	1912	1913	..	1½	..	2 *6-in.*, 8 *4.7-in.*, 14 smaller.	2	22·0	630	300

* Ballooning service.

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ITALY.—Cruising Ships—*continued.*

Class.	NAME.	Displacement.	Length	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
3rd cl. *cr.*	**Liguria**	2245	262½	39¼	16¾	7677 *t*	Sestri (Ansaldo)	1893	1894	183,120	2	4½	2 *5·9-in.*, 6 *4·7-in.*, 2 *3-in.*, 2 *2·2-in.*, 4 smaller	2	19·6 *t*	430	257
Scout	**Marsala**	3400	460½	42¾	13¼	22,500 P. tur. Bl.	Castellammare	1912	..	..	1½	..	6 *4·7-in.* and 6 *12-pr.*, mining equipment	2	28·0	800	240
to.g.b.	**Minerva**	833	246	27½	11¾	4800 W.T.	Sestri (Ansaldo)	1892	1893	72,720	1	..	1 *4·7-in.*, 6 *2·2-in.*, 3 *1·4-in.*	5	21·0	120	111
3rd cl. *cr.* 3rd cl. *cr.*	**Mirabello** **N.**	5000	..	..	..	..	..	Pro.	..	..	..	..	*6-in.* guns.	..	27·5	..	..
Scout	**Nino Bixio**	3400	460½	42¾	13¼	22,500 Bl. Cur. t.	Castellammare	1911	..	..	1½	..	6 *4·7-in.* and 6 *12-pr.*, mining equipment	2	28·0	800	240
3rd cl. *cr.*	**Puglia**	2498	269	41	16¾	7000	Taranto.	1898	1901	200,000	4½	1	4 *5·9-in.*, 6 *4·7-in.*, 1 *2·9-in.*, 8 *2·2-in.*, 8 *1·4-in.*, 2 M.	2	20·0	650	257
Scout	**Quarto**	3220	432	42¾	13¼	29,000 P. tur. Bl.	Venice	1911	1912	..	1½	..	6 *4·7-in.* and 6 *12-pr.*, mining equipment	2	28·6	450	240
g.v.	**Sebastiano Caboto**	800	250	31¾	9	2000	Palermo	1912	..	..	..	..	6 *12-pr.*, 4 M.	..	13·0	100	..

Etna (3474 tons), converted into a training ship. Goito, Montebello, Partenope and Tripoli, mining vessels. *Subsidised auxiliary cruisers and despatch vessels.*—Nord America (La Veloce S.S. Co.), Regina Margherita, Galileo Galilei, Marco Polo, Umberto I., Cristoforo Colombo, Elettrico, Candia, Malta, Perseo, Orione, and some others (Navigazione Generale), Messina and Siracusa (19¾ knots), Catania and Palermo (23 knots). Principessa Mafalda (18½ knots) Italian Lloyd. The armament of these vessels is 2 2·2-in. Q.F., and 4 1·4-in. H. The coal and liquid fuel transports Bronte and Sterope (9490 tons) are completed. Oil tankers Givoe and Nettuno, 6000 tons capacity, and five of 760 tons capacity, building. Anteo, submarine salvage vessel, lifting power 400 tons, completed at Schiedam. Provision is made for a river gunboat. Lagoon gunboats Brondolo and Marghera. A surveying vessel, Ammiraglio Magnaghi, 1800 tons, 14 knots, is in hand. Small vessels, Capitano Verri (*ex*-Thetis) and Bengazi (*ex*-Derna) captured from the Turks.

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JAPAN.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Second-ary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.						in.	in.	in	in.	in.	in.			knots.	tons.	
a.c.	Adzuma	9436	431½	59¼	24¾	17,000 B.	St. Nazaire	1899	1901	..	7–3½ H. S.	3	5 H.S.	..	6 H. S.	6 H.S.	4 *8-in.*, 12 *6-in.*, 12 *3-in.*, 8 *1·8-in.*	5 (4 sub.)	20·0	600/1275	482
b.	Aki	19,800	400	83½	27½	24,000 My. tur.	Kure	1907	1911	..	9–5 K. S.	2–3	8	..	9	6	4 *12-in.*, 12 *10-in.*, 8 *6-in.*, 8 *12-pr.*, 8 l. and M.	5 (sub.)	20·5	..	940
”	Asahi	14,765	400½	75¼	27½	16,000 B.	Clydebank	1899	1900	..	9–4 H. S.	4–2½	6 H.S.	12 H.S.	14 H. S.	6 H.S.	4 *12-in.*, 14 *6-in.*, 20 *12-pr.*, 8 *3-pr.*, 4 *2½-pr.*	4 (sub.)	18	700/1549	750
a.c.	Asama	9885	408	67	24½	19,000 *t*	Elswick	1898	1899	..	7–3½ H. S.	2	5 H.S.	..	6	6 H.S.	4 *8-in.*, 14 *6-in.* (A.), 12 *12-pr.*, 8 *2½-pr.*	5 (4 sub.)	22·1 *t*	600/1409	482
”	Aso (*ex* Bayan)	7726	443	55¾	22	17,400 My. *t.*	La Seyne	1900	1902	..	8–3 K.S.	2	3 K.S.	..	7 K.S.	3 K.S.	2 *8-in.*, 8 *6-in.*, 22 small, l., and M.	2 (sub.)	22 *t*	750/11,000	570
b.	Fuji	12,649	374	73	26½	14,000	Thames	1896	1897	..	18–6 H. S.	4–2½	4 H.S.	..	14 H. S.	6 H.S.	4 *12-in.*, 10 *6-in.*, 20 *3-pr.*, 4 *4½-pr.*	5 (4 sub.)	19·2 *t*	1100	600
b	Fuso *	31,000	..	..	..	45,000 tur.	Kure	1914	..	..	12 K.S.	..	..	..	12 K.S.	..	12 *14-in.*, 16 *6-in.*, 4 *12-pr.*	..	22·5	..	..
b.c.	Haruna	27,500	704	92	27½	64,000 My. P. t. My. C. t.	Kobe (Kawasaki)	1913	..	..	10 K.S.	2¾	..	..	10 K.S.	..	8 *14-in.*, 16 *6-in.*, 18 smaller and M.	8 (sub.)	27	1000/3500	1100
”	Hiyei						Yokosuka	1912	..												
b.	Hizen (*ex* Retvizan)	12,700	374	72¼	25	16,000 My.	Philadelphia	1900	1902	..	9–4 K.S.	4	6–2 K.S.	9 K.S.	10 K.S.	5 K.S.	4 *12-in.*, 12 *6-in.*, 20 *3-pr.*, 6 *1-pr.*	2	18·0	800/2000	778
a.c.	Ibuki	14,620	450½	75½	26¼	27,000 My. tur.	Kure	1907	1909	..	7–4 K.S.	2	5 K.S.	..	9 K.S.	..	4 *12-in.*, 8 *8-in.*, 14 *4·7-in.*, 3 *1·8-in.*, 2 l., 4 M.	3 (sub.)	22	2000	820
b.	Idzumo	9750	400	68½	24½	17,300 B. *t.*	Elswick	1899	1900	..	7–3½ H.N.S.	2½	5 H. N.S.	..	6 H. N.S.	6 H. N.S.	4 *8-in.*, 14 *6-in.*, 12 *12-pr.*, 8 *2½-pr.*	4 (sub.)	22·0	600/1412	672
”	Iwate							1900	1901										21·7 *t*		
a.c.	Ikoma	13,750	440	75	26	22,670 My.	Kure	1906	1908	..	7–5 K.S.	1½	..	..	7 K.S.	..	4 *12-in.*, 12 *6-in.*, 12 *4·7-in.*, 2 *1·8-in.*, 2 l., 4 M.	3 (sub.)	21·0	600/2000	817

* Particulars uncertain.

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JAPAN.—Armoured Ships—*continued.*

Class.	NAME.	Displacement.	Length.	Beam	Draught.	Indicated Horse Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Secondary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
b.	**Iwami** (*ex* Orel)	13,516	367½	76	26	16,000 My.	St. Petersburg (Galerny)	1902	1904	..	9–4 K.S.	2½–1½	6 K.S.	9 K.S.	10 K.S.	6 K.S.	4 *12-in.*, 6 *8-in.*, 24 *3-in.*, and smaller.	3 (2 sub.)	18·0	800 2000	740
b.	**Kashima**	16,400	425	78⅛	27	17,280 Nic.	Elswick	1905	1906	..	9–4 K.S.	3–2½	6	6	9 K.S	6 K.S.	4 *12-in.*, 4 *10-in.*, 12 *6-in.*, 12 *12-pr.*, 3 *3-pr.*, 6 M., 2 l.	5 (sub.)	19·2 *t*	750 2150	980
a.c.	**Kasuga**	7630	344	59¾	24¼	14,900	Sestri Ponente	1902	1904	760,000	6 H. N.S.	1½	6 H. N.S.	6 H. N.S.	6 H. N.S.	6 H. N.S.	1 *10-in.*, 2 *8-in.*, 14 *6-in.*, 10 *3-in.*, 6 *1·8 in.*, 2 M.	4	20·0	600 1150	500
	Katori	15,950	420	78	27	18,500 *t*, Nic.	Barrow	1905	1906	..	9–5 K.S.	3–2	6	6	10 K.S.	6 K.S.	4 *12-in.*, 4 *10-in.*, 12 *6-in.*, 10 *12-pr.*, 3 *3-pr.*, 6 M., 2 l.	5 (sub.)	19·5 *t*	750 1800	980
b.	**Kawachi**	20,800	500	84	28	26,500 tur.	Kure	1910	1912	..	12–9½ K.S.	2½	9 K.S.	..	12 K.S.	6 K.S.	12 *12-in.*, 10 *6-in.*, 8 *4·7-in.*, 16 small, l. and M.	5 (sub.)	20·5	900 2500	960
b.c.	**Kirishima**	27,500	704	92	27½	64,000 My P. t.	Nagasaki (Mitsubishi)	1913	..	..	10–4 K.S.	2¾	..	..	10 K.S.	..	8 *14-in.*, 16 *6-in.*, 18 smaller and M.	8 (sub.)	28·0	1000 3500	1100
	Kongo	27,500	704	92	27½	64,000 Y. P. t.	Barrow	1913	1913	2,500,000	10–4 K.S.	2¾	..	..	10 K.S.	..	8 *14-in.*, 16 *6-in.*, 5 M., 16 smaller	8 (sub.)	25·0	1000 3500	1100
a.c.	**Kurama**	14,620	450½	75½	26¼	27,000 My.	Yokosuka	1907	1911	..	7–4 K. S.	2	5 K.S.	..	9 K. S.	..	4 *12-in.*, 8 *8-in.*, 14 *4·7-in.*, 3 *1·8-in.*, 2 l., 4 M.	3 (sub.)	22·0	2000	820
b.	**Mikasa**	15,362	400	76	27¼	16,431 B.	Barrow	1900	1902	..	9–4 H.N.S.	3	6 H. N.S.	12 H. N.S.	14 H. N.S.	6 H. N.S.	4 *12-in.*, 4 *10-in.*, 10 *6-in.*, 20 small	4 (sub.)	18·5 *t*	700 1520	935
c.d.	**Mishima** (*ex* Seniavine)	4792	265	52½	17	5000 My.	St. Petersburg	1894	1895	410,000	10	3	..	..	7–8	..	4 *10-in.*, 4 *4·7-in.*, 6 *1·8-in.*, 8 M.	4	16·0	400	318

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a.c.	Nisshin . .	7630	344	59¾	24¼	13,500	Sestri Ponente	1903	1904	760,000	6 H. N.S.	1½	6 H. N.S.	6 H. N.S.	6 H. N.S.	6 H. N.S.	4 *8-in.*, 14 *6-in.*, 10 *3-in.*, 6 *1·8-in.*, 2 M.	4	20·0	600 / 1150	500
c.d.	Okinoshima (*ex* Apraxine)	4126	277½	52½	17½	5757 *t.*	St. Petersburg (New Admiralty)	1896	1898	..	10 H. S.	3	..	..	7¾ K. S.	..	3 *10-in.*, 4 *4·7-in.*, 12 *1·8-in.*, and smaller	4	15·0 *t*	215	318
b.	Sagami (*ex* Peresviet)	12,674	401¼	71½	26	15,060 My.	St. Petersburg (Baltic)	1898	1901	..	9–7 H. S.	2¾	6 H. S.	9 H. S.	9 H. S.	6 H.S.	4 *10-in.*, 10 *6-in.*, 20 *12-pr.*, and smaller	2 (sub.)	18·0	800 / 2056	732
b.	Satsuma . .	19,350	450	83½	27½	19,370 My.	Yokosuka .	1906	1910	..	9–5 K. S.	2–3	8	..	9	6	4 *12-in.*, 12 *10-in.*, 12 *4·7-in.*, 4 *12-pr.*, 8 l. and M.	5 (sub.)	18·5	1000 / 2500	940
b.	Settsu . . .	20,800	500	84	28	26,500 tur.	Yokosuka .	1911	1912	..	12–9½ K.S.	2½	9 K.S.	..	12 K.S.	6 K.S.	12 *12-in.*, 10 *6-in.*, 8 *4·7-in.*, 16 small, l. and M.	5 (sub.)	20·5	900 / 2500	960
b.	Shikishima . .	14,850	400	75¼	26½	16,355 B.	Thames .	1898	1899	..	9–4 H.N.S.	4–2½	6 H. N.S.	12 H. N.S.	14	6 H. N.S.	4 *12-in.*, 14 *6-in.*, 20 *12-pr.*, 8 *3-pr.*, 4 *2½-pr.*, 8 M.	5 (4 sub.)	18·3	700 / 1722	741
b	Suo (*ex* Pobieda) .	12,674	401¼	71½	26	14,500 My.	St. Petersburg (Baltic)	1900	1901	..	9½–4 H. S.	2¾	9 H. S.	9 H. S.	9 H. S.	6 H.S.	4 *10-in.*, 10 *6-in.*, 22 *12-pr.*, and smaller	2 (sub.)	18·0	800 / 2056	732
b.	Tango (*ex* Poltava)	10,960	367½	69	26	11,255 My.	St. Petersburg	1894	1898	1,098,000	15¾	3½	4	9	10 H. S.	6	4 *12-in.*, 12 *6-in.*, 14 smaller	2	16·0	900	700
a.c.	Tokiwa . .	9850	408	67	24½	20,556 *t.*	Elswick .	1898	1899	..	7–3½ H. S.	2	5 H.S.	..	6 H. S.	6 H.S.	4 *8-in.*, 14 *6-in.* (A.), 12 *12-pr.*, 8 *2½-pr.*	5 (4 sub.)	23·0	600 / 1409	500
„	Tsukuba . .	13,750	440	75	26	23,260 My.	Kure . .	1905	1907	..	7–5 K. S.	1½	..	..	7 K. S.	..	4 *12-in.*, 12 *6-in.*, 12 *4·7-in.*, 2 *1·8 in.*, 2 l, 4 M.	3 (sub.)	21·0	600 / 2000	817
„	Yakumo . .	9850	407¾	64¼	23¾	16,000 B.	Stettin .	1899	1901	..	7–3½ H. S.	2½	5 H.S.	..	6 H. S.	6 H.S.	4 *8-in.* (A.), 12 *6-in.*, 12 *12-pr.* (A.), 8 *2½-pr.*	5 (4 sub.)	20·0	600 / 1100	500

Iki (*ex* Nicolai I.), 9672 tons (1888), 2 *12-in.*, 4 *9-in.*, 8 *6-in.*, gunnery ship.

A battleship of the Fuso class has been laid down at Yokosuka, and two others are projected, to be built at the Kawasaki yard, Kobe, and the Mitsubishi yard, Nagasaki, respectively.

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JAPAN.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
l.cr.	**Akashi**	2800	295¼	41¾	16½	8500	Yokosuka	1897	1898	327,000	2	4½ shield	2 *6-in.* (A.), 6 *4·7-in.*, 10 *3-pr.*, 2 *2½-pr.*, 4 M.	2	20·0	200 544	300
„	**Akitsushima**	3150	302	42½	18¼	8400	Yokosuka	1892	1893	..	3	..	4 *6-in.*, 6 *4·7-in.*, 10 *3-pr.*	4	19·0	..	330
t.g.b.	**Chihaya**	1250	273	31½	10	5500 Nor.	Yokosuka	1900	1901	..	..	..	2 *4·7-in.*, 4 *12-pr.*	2	21·0	123 344	170
l.cr.	**Chitose**	4992	395	49	18	15,500	San Francisco	1898	1899	205,200	4½	4½ shield	2 *8-in.*, 10 *4·7-in.*, 12 *12-pr.*, 6 *2½-pr.*	4	22·5	350 1000	405
„	**Hashidate**	4277	295	50¾	21¼	5400 My.	Yokosuka	1891	1893	..	2	12	1 *12·5-in.* (Canet), 11 *4·7-in.*, 5 *6-pr.*, 11 *3-pr.*, 6 M.	2	17·0	400	350
„	**Hirado**	4950	440	46½	16¾	22,500 P. tur. My.	Kobe	1911	1912	..	2¼	..	8 *6-in.*, 4 *3-in.*, 4 M.	3 (sub.)	26	500 1000	390
„	**Itsukushima**	4277	295	50¾	21½	5400 B.	La Seyne	1891	1893	..	2	12	1 *12·5-in.* (Canet), 11 *4·7-in.*, 5 *6-pr.*, 11 *3-pr.*, 6 M.	2	17·0	400	350
„	**Kasagi**	4503	374½	48¾	19	15,492	Philadelphia	1898	1899	205,200	4½–1¾	4½ shield	2 *8-in.*, 10 *4·7-in.*, 12 *12-pr.*, 6 *1·8-in.*	4	22·7 t	350 1000	405
Scout	**Mogami**	1329	300	31½	9¾	8000 turbines	Sasebo	1907	1908	..	2½	..	2 *4·7-in.*, 4 *12-pr.*	2	23·0	..	180
l.cr.	**Niitaka**	3420	235½	44	16½	10,000 Nic.	Yokosuka	1902	1905	..	2½	..	6 *6-in.*, 10 *3-in.*, 4 *2½-pr.*	..	20·0	600	320
„	**Otowa**	3000	321	42½		10,000 My.	Yokosuka	1903	1904	..	2	..	2 *6-in.*, 6 *4·7-in.*, 4 *12-pr.*, 2 M., 2 l.	..	20·0	600 875	310

g.b.	**Saga**	785	..	..	..	1600	Sasebo . .	1912	1913	..	..	..	1 *4·7-in.*, 3 *3-in.*, 3 M. . .	..	15	..	..
cr.	**Shikuma** . . .	4950	440	46½	16¾	22,500 Cur. t. My.	Sasebo . .	1911	1912	..	2¼	..	8 *6-in.*, 4 *3-in.*, 4 M. . .	3 (sub.)	26	500 1000	390
„	**Soya** . . . . (*ex* Varyag)	6500	420	52	20¾	20,000 My.	Philadelphia .	1899	1900	..	3	..	12 *6-in.*, 12 *12-pr.*, 6 *3-pr.* .	3 (sub.)	23·0	770 1250	571
„	**Suma**	2657	306¾	40	16¼	8500	Yokosuka . .	1896	1898	237,000	2 shield	4½ 4 M.	2 *6-in.*, 6 *4·7-in.*, 12 *3-pr.*.	2	20·0	200	300
t.g.b.	**Tatsuta** . . .	875	240	27½	13	5500	Elswick . .	1894	1894	..	..	..	2 *4·7-in.*, 4 *3-pr.*. . . .	2	21·0	200	150
cr.	**Tone**	4035	400	48½	16¾	15,000 My.	Sasebo . .	1907	1908	..	2–3	..	2 *6-in.*, 10 *4·7-in* , 21 *2-pr.*, 2 l.	3	23·0	750 1000	392
Scout	**Tsugaru** . . . (*ex* Pallada)	6630	413¼	55¾	21	11,610 My.	St. Petersburg (Galerny)	1899	1901	..	2½	..	8 *6-in.*, 20 *12-pr.*, 8 *1-pr.* .	4	20·0	900 1400	422
cr.	**Tsushima** . . .	3420	235½	44	16½	10,000 Nic.	Kure . .	1902	1904	..	2½	..	6 *6-in.*, 10 *3-in.*, 4 *2½-pr.* .	..	20·0	600	320
g.b.	**Uji**	620	180½	27¾	10	1000 B.	Kure . .	1903	1905	..	..	..	4 *12-pr.*, 3 M. . . .	..	13·0	100	150
cr.	**Yahagi** . . .	4950	440	46½	16¾	22,500 P. tur. My.	Nagasaki . .	1911	1912	..	2¼	..	8 *6-in.*, 4 *3-in.*, 4 M. . .	3 (sub.)	26	500 1000	390
„	**Yodo**	1230	280	32	9¾	6500	Sasebo . .	1908	1909	..	..	..	2 *4·7-in.*, 4 *12-pr.* . . .	2	22·0	..	180

Submarine depôt ships Toyohashi, 4,120 tons, 2 *4·7-in.* guns, and Karasaki (*ex* Ekaterinoslav), 10,500 tons, 5 light guns.
Repair ship Kwanto Maru. Training vessels Amagi, Maja, Manju, Kangu, Iwaki, Teuriu, Teukushi. **Amakusa**, mining vessel (*ex* Amur).
Mercantile auxiliaries: Umegaku Maru, Sakaki Maru, Sakura Maru, 3200 tons, 21 knots; Tsijo Maru, Tenjo Maru, 13,400 tons, 20 knots.
Also the gunboats Toba, 250 tons; Fushimi, 180 tons; and Sumida, 126 tons.

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NETHERLANDS.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position. Heavy Guns.	Second-ary.	Armament. Guns.	Torpedo Tubes.	Speed.	Coal	Complement.
		tons	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots	tons.	
a g b.	Brinio . . .																				
,,	Bruno . . .	520	171	28	9¼	1200	Amsterdam .	1912 1913	..	..	2 K.S.	¾	..	..	..	..	4 4·1-*in.*, 2 M.	..	16	il	49
,,	Friso . . .																				
c.d.s.	De Ruyter . .	5014	316¾	51½	21¾	6377 *t.*	Amsterdam .	1900	1904	347,500	6–4 H.N.S.	2	..	..	10 H.N.S.	3 H.S.	2 9·4-*in.*, 4 5·9-*in.*, 10 2·9-*in.*, 4 1·4-*in.*	3 2 sub.	16·5 *t*	680	444
,,	Evertsen . . .	3464	282¾	47	16¾	4735	Flushing .	1894	1896	..	6–4 H.S.	2	..	..	9½ H.S.	3 H.S.	3 8·2-*in.*, 2 5·9-*in.*, 6 2·9-*in.*, 8 1·4-*in.*	3	16·0	280	268
,,	Hertog Hendrik .	5014	316¾	51½	21¾	6000 Y.	Amsterdam .	1902	1903	347,500	6 H.N.S.	2	..	..	10 H.N.S.	3 H.S.	2 9·4-*in.*, 4 5·9-*in.*, 10 2·9-*in.*, 4 1·4-*in.*, 2 1.	3	16·5	680	444
,,	Jacob van Heemskerck	5211	316¾	51½	21¾	6000 Y	Amsterdam	1906	1908	347,500	6–4 H.N.S.	2	..	..	10 H.N.S	..	2 9·4-*in.*, 6 5·9-*in.*, 10 12-*pr.*, 4 1·4-*in.*, 2 1.	3 2 sub	16·0	680	441
,,	Koningin Regentes	5014	316¾	51½	21¾	7290 Y.	Amsterdam .	1900	1902	347,500	6–4 H.N.S.	2	..	..	10 H.N.S.	..	2 9·4-*in.*, 4 5·9-*in.*, 6 2·9-*in.*, 4 1·4-*in.*, 2 1.	3 2 sub.	16·5	680	444
,,	Kortenaer . .	3464	282¾	47	16¾	4400	Amsterdam .	1894 1909	1896	..	6 H.S.	2	..	..	9½ H.S.	3 H.S.	3 8·2-*in.*, 2 5·9-*in.*, 6 2·9-*in.*, 8 1·4-*in.*	3	16·0	280	260
,,	Marten Tromp .	5211	316¾	51½	21¾	6377 *t*	Amsterdam .	1904	1906	347,500	6–4 H.N.S.	2	..	..	10 H.N.S.	3 H.S.	2 9·4-*in.*, 4 5·9-*in.*, 10 2·9-*in.*, 4 1·4-*in.*	3 2 sub.	16·5 *t*	680	444
,,	Piet-Hein . .	3464	282¾	47	16¾	4736 *t*	Rotterdam .	1894	1896	..	6 H.S.	2	..	..	9½ H.S.	3 H.S.	3 8·2-*in.*, 2 5·9-*in.*, 6 2·9-*in.*, 8 1·4-*in.*	3	16·2 *t*	280	260
,,	Reinier Claeszen .	2440	229½	44¼	15	350	Amsterdam .	1891	1892	..	4¾–2 *comp.*	3	..	..	11 *comp.*	6 *comp. shield*	1 8·2-*in.* (*K.*), 1 6·6-*in.*, 1 2·9-*in.*, 4 1 9-*in.*, 3 1·4-*in.*	2	12·5 *t*	88	160
,,	De Zeven Provincien	6525	339½	56	20¼	7500 Y.	Amsterdam .	1909	1910	..	6–4 K.S	2	..	..	10 K.S.	..	2 11-*in.*, 4 5·9-*in.*, 10 12-*pr.*	..	16·0	700	440

NETHERLANDS.—Cruising Ships.

((I) denotes vessels of the Dutch Indian Navy.)

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	inches.	inches.			knots.	tons.	
cr.	Friesland	3847	307	49	17¾	10,000 Y.	Rotterdam	1896	1898	285,700	2	..	2 5·9-in., 6 4·7-in., 4 2·9-in., 8 1·4-in., 4 smaller.	4	19·8 t	400	333
„	Gelderland	3969	310¾	49	17¾	10,000 Y.	Feijenoord	1898	1900	..	2¼	..	2 5·9-in., 6 4·7-in., 4 2·9-in., 4 1·4-in., 4 M.	4	20·0	850	333
„	Holland	3847	307	49	17¾	10,000 Y.	Amsterdam	1896	1898	285,700	2	..	2 5·9-in., 6 4·7-in., 4 2·9-in., 8 1·4-in., 4 M.	4	19·6 t	400	333
g. v.	Koetel (I)	778	179	30¾	11½	1412	Amsterdam	1898	1899	..	..	..	3 4·7-in., 2 2·9-in., 4 1 4-in.	..	13·0	120	97
„	Mataram (I)	797	179½	30¾	11¾	1100	Amsterdam	1896	1897	..	..	..	3 4·7-in., 2 3-in., 2 1·4-in.	..	13·0	113	95
cr.	Noord-Brabant	3969	310¾	49	17¾	10,000 Y.	Flushing	1899	1901	..	2¼	..	2 5·9-in., 6 4·7-in., 4 2·9-in., 4 1·4-in., 4 M.	4	20·0	850	333
g. v.	Serdang (I)	797	179½	30¾	11¾	1100	Flushing	1897	1898	..	..	..	3 4·7-in., 2 2·9-in., 4 1·4-in.	..	13·0	113	95
cr.	Sumatra (I)	1693	229½	37	14	3750	Amsterdam	1890	1892	..	1½	..	1 8·2-in., 1 5·9-in., 2 4·7-in., 1 2·9-in., 4 3-pr., 2 M.	..	17·0	225	183
„	Utrecht	3969	310¾	49	17¾	10,000	Amsterdam	1898	1900	..	2¼	..	2 5·9-in., 6 4·7-in., 4 2·9-in., 4 1·4-in., 4 M.	4	20·0	850	333
„	Zeeland	3847	307	49	17¾	10,589 Y. t	Flushing	1897	1898	285,700	2	..	2 5·9-in., 6 4·7-in., 4 2·9-in., 8 1·4-in., 4 M.	4	19·4 t	400	333

About 22 gun-vessels of small value are in home waters. Gun-vessels of the Indian Navy: Edi (787 tons), 1898; Glatik (417 tons), 1894; Havik, Snip, Sperwer, Kwartel, Favant, and Valk, launched between 1894 and 1903; Argus and Cycloop (438 tons), 1893, many older. Hydrograaf, surveying ship. Surveying vessels in the East Indies: Borneo, 787 tons, Lombok and Sumbawa, 591 tons Mine-layers in the East Indies: Assahan, 787 tons, Siboga, 778 tons. Two (670 tons, 10 knots) mine-layers, Medusa and Hydra, launched 1911, 3 3-in guns, 65 mines). A mother ship for submarines has been built.

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NORWAY.—Armoured Ships.

Class.	NAME	Displacement.	Length.	Beam	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Secondary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			in.	in.			knots.	tons.	
c.d.s.	Bjoergvin . / Nidaros .	3400	295¼	50	16½	4500	Elswick	Bldg.	..	..	7 K.S.	2	..	..	8 K.S.	6 K.S.	2 9·4-in., 4 5·9-in., 6 3-in. . .	2 sub.	16·5	..	250
„	Eidsvold . / Norge .	3847	290	50½	16½	4500 Y.	Elswick	1900	1901	350,000	6 H.N.S.	2	..	..	6 H.N.S.	6 H.N.S	2 8·2-in., 6 5·9-in., 8 12-pr., 6 3-pr.	2 sub.	16·5 t	400 600	261
„ / „	Harald Haarfagre . / Torkenskjold	3556	280	48½	16½	3700	Elswick	1896 / 1897	1898 / 1899	300,000	7 H.S.	2	..	..	8 H.S.	..	2 8-in., 6 4·7-in., 6 12-pr., 6 1½-pr.	2 sub.	17·2 t	200 500	248

Cruising Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
g.b.	Æger . . .	387	108½	29½	8	450	Horten .	1892	1893	..	1½	..	1 8·2-in., 1 2·7-in., 2 1·9-in. . .	..	9·0	..	43
g.v.	Frithjof . .	1349	216½	32¾	13¼	300	Horten .	1896	1898	..	..	..	2 4·7-in., 4 2·9-in., 4 1·4-in., 2 l. . .	3 sub.	15·0	120	156
g.b.	Heimdal . .	620	167¼	26¾	11¾	700	Christiania .	1892	1893	..	..	..	4 2·5-in.	..	12·0	92	62
g.v.	Viking . .	1095	203½	30½	13	2000	Horten .	1891	1892	..	1½	..	2 5·9-in. (A.), 4 2·5-in., 4 1·4-in., 2 M. .	3	15·0	140	156

Eleven Gunboats, of 189 to 280 tons, and of 180 to 450 I.H.P., armed with one large gun and machine guns.

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PORTUGAL.—Armoured Ship.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Secondary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots	tons.	
b.	**Vasco da Gama**	2972	233	40	18¼	6000 W.T.	Blackwall Leghorn	1876	1878 1903	132,000	9¾-4	3	6 K.S.	..	7¾ K.S.	..	2 *8-in.*, 4 *4·7-in.*, 2 *2·5-in.*, 2 *1-pr.*, 4 M.	2 (sub.)	15·0	300	218

Cruising Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
cr.	**Adamastor**	1962	250	35	14	4000	Leghorn	1896	1897	..	3	5	2 *5·9-in.*, 4 *4·7-in.*, 4 *2·2-in.*, 4 M.	3	18·0 *t*	270	232
,,	**Almirante Reis** (ex Dom Carlos I.)	4100	360	46½	17½	12,500 Y.	Elswick	1898	1899	..	4	..	4 *5·9-in.* (A.), 8 *4·7-in.*, 12 *3-pr.*, 6 *1-pr.*, 4 M.	5 (3 sub.)	22·0	1000	260
g.v.	**Dom Luiz I.**	710	151	27¼	13¾	512	Lisbon	1895	1896	..	..	..	4 *4·1-in.*, 3 *2·5-in.*, 3 M.	..	9·9	100	120
,,	**Patria**	620	196¾	27½	8½	1800	Lisbon	1903	1905	..	..	..	4 *4-in.*, 6 *1·8-in.*	..	15·0	..	160
cr.	**Republica.** (ex Rainha Amelia)	1640	246	36	14¾	5000 Nor.	Lisbon	1899	1901	..	1	..	4 *5·9-in.*, 2 *3·9-in.*, 2 *3-pr.*, 4 M.	2	20·6 *t*	300	250
,,	**São Gabriel**	1772	246	35½	14¼	4000 N.S.	Havre	1898	1899	..	1½	..	2 *5·9-in.* (*Canet*), 4 *4·7-in.*, 8 *1·8-in.*, 2 M.	1	17·5 *t*	500	200

Two cruisers of 2500 tons and 20 knots, 2 6-in. and 6 4-in. guns, are proposed. There are several small gunboats for Mozambique and Timor, and some river-gunboats. Mine-layer, Vulcano, 110 ft. long, 19 ft. 6 in. beam, 400 I.H.P., 12 knots, launched by Thornycroft, 1909.

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RUSSIA.—Armoured Ships.

(B.S., Black Sea Fleet.)

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkheads.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Secondary.	Armament. Guns. B.L.R. are of Russian Krupp pattern.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
a.c.	**Admiral Makaroff**	7887	443	75¾	23	19,000 B.	La Seyne	1906	1908		6¾–4 K.S.	2	3 K.S.	6¾ K.S.	5¾ K.S.	3 K.S.	2 *8-in.*, 8 *6-in.*, 20 *12-pr.*, 4 *6-pr.*, 6 l. and M.	2 sub.	22·5 t	750 1020	573
b.	**Alexander III** (Imperator), B.S.	22,500	551¼	89½	27¼	26,500 tur.	Nikolaieff (Ivanoff)	1914	..	..	12 K.S.	3	8 K.S.	..	12 K.S.	5 K.S.	12 *12-in.*, 20 *5-in.*	4 sub.	21·0	3000	..
b.	**Andrei Pervozvannyi**	17,400	429¾	79¾	28½	17,600 B.	St. Petersburg (Galerny)	1906	1910	1,170,000	11–6 K.S.	2½	5 K.S.	..	12 K.S.	7 K.S.	4 *12-in.*, 14 *8-in.*, 12 *4·7-in.*, 14 smaller	3 sub.	18·0	1500	933
a.c.	**Bayan**	7887	443	75¾	23	16,500 B.	St. Petersburg (New Admiralty)	1907	1910	..	6¾–4 K.S	2	3 K.S.	6¾ K.S.	5¾ K.S.	3 K.S.	2 *8-in.*, 8 *6-in.*, 20 *12-pr.*, 4 *6-pr.*, 6 l. and M.	2 sub.	21·0	750 1020	573
b.c.	**Borodino**	32,200	749½	99¼	..	66,000 Y. T.	St. Petersburg (New Admiralty)	Bldg.	..	..	12 K.S.	..	..	..	..	..	12 *14-in.*, 21 *5·1-in.*, 4 *3-pr.*	..	27	..	..
b.	**Cesarevitch**	12,912	388¾	76¼	26½	16,500 B.	La Seyne	1901	1903	..	9¾–4 K.S.	2½	6 K.S.	9 K.S.	10–11 K.S.	6¾ K.S.	4 *12-in.*, 12 *6-in.*, 20 *3-in.*, 6 *1·4-in.*, 4 M., 2 l.	2 sub.	19·6 t	900 1350	732
b.	**Ekaterina II**, B.S.	22,500	551¼	89½	27¼	26,500 tur.	Nikolaieff (Belgian Co.)	Bldg.	..	..	12 K.S.	3	8 K.S.	..	12 K.S.	5 K.S.	12 *12-in.*, 20 *5-in.*	4 sub.	21·0	3000	..
b.	**Evstafi** (Sviatoi), B.S.	12,733	372¼	72¾	27	10,600 B.	Nicolaieff	1906	1911	..	9–3 K.S.	2½	6 K.S.	7–5 K.S.	10 K.S.	5 K.S.	4 *12-in.*, 4 *8-in.*, 12 *6-in.*, 14 *3-in.*, 10 smaller, 6 M., 2 l.	3 sub.	16	670 1400	731
b.	**Gangut**	23,000	590½	87	27¼	42,000 Y tur.	St. Petersburg (New Admiralty)	1911	..	..	11–4 K.S.	3	8 K.S.	4 K.S.	11½ K.S.	5 K.S.	12 *12-in.*, 16 *4·7-in.*, 4 *3-pr.*, 8 M.	4 sub.	23	1200 3000	..
a.c.	**Gromoboi** shd.	13,220	478	68½	26	15,500	St. Petersburg (Baltic)	1899	1900	..	6 H.S.	3	4¾ H.S	6 H.S.	6 H.S.	4¾ H.S.	4 *8-in.*, 22 *6-in.*, 20 *3-in.*, 11 small Q.F. and M.	4 sub.	20·0	500 855	814
b.	**Ioann Zlatoust**, B.S.	12,733	372¼	72¾	27	10,600 B.	Sebastopol	1906	1910	..	9–3 K.S.	2½	6 K.S.	7–5 K.S.	12–10 K.S.	5 K.S.	4 *12-in.*, 4 *8-in.*, 12 *6-in.*, 14 *3-in.*, 10 smaller, 6 M., 2 l.	5 sub.	16·0	670† 1400	636
b.c. b.c.	**Ismail** **Kinburn**	32,200	749½	99¼	..	66,000 Y. tur.	St. Petersburg (Baltic)	Bldg.	..	..	12 K.S.	..	..	..	..	..	12 *14-in.*, 21 *5·1-in.*, 4 *3-pr.*	..	27	..	..

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a.g.b.	**Khrabry** . . .	1735	229	41¾	11	3000 Nic.	St. Petersburg (New Admiralty)	1895	1896	..	5	1½	..	3½	..	..	2 *8-in.*, 8 Q.F. . . .	2	15·0	100	120
b.	**Maria** (Imperatritsa), B.S. .	22,500	551¼	89½	27¼	26,500 tur.	Nicolaieff . (Ivanoff)	1913	..	..	12 K.S.	3	8 K.S.	..	12 K.S.	5 K.S.	12 *12-in.*, 20 *5-in.* .	4 sub.	21·0	3000	..
b.c.	**Navarin** . . .	32,200	749½	99¼	..	66,000 Y. tur.	St. Petersburg (New Admiralty)	Bldg.	..	..	12 K.S.	..	..	..	..	..	12 *14-in.*, 21 *5·1-in.*, 4 *3-pr.*	..	27	..	..
a.c.	**Pallada** . . .	7900	443	75¾	23	16,500 B.	St. Petersburg (New Admiralty)	1906	1910	..	6¾–4 K.S.	2	3 K.S.	6¾ K.S.	5¾ K.S.	3 K.S.	2 *8-in.*, 8 *6-in.*, 20 *12-pr.*, 4 *6-pr.*, 6 l. and M.	2 sub.	21·0	750 1020	573
b.	**Panteleimon, B.S.** (*ex* Potemkine)	12,582	372¼	72¾	27	10,600 B.	Nicolaieff .	1900	1902	..	9 3 K.S.	2½	6 K.S.	7–5 K.S.	12–10 K.S.	5 K.S.	4 *12-in.*, 16 *6-in.*, 14 *3-in.*, 14 *1·4-in.*	5 sub.	17·0	670†	636
b.	**Pavel I** (Imperator) .	17,400	429¾	79¾	28½	17,600 B.	St. Petersburg (Baltic)	1907	1911	1,170,000	11–6 K.S.	2½	5 K.S.	..	12 K.S.	7 K.S.	4 *12-in.*, 14 *8-in.*, 12 *4·7-in.*, 14 smaller.	3 sub.	18·0	1500	933
b.	**Petropavlovsk** .	23,000	590½	87	27¼	42,000 Y. tur.	St. Petersburg (Baltic)	1911	..	2,800,000	11–4 K.S.	3	8 K.S.	4 K.S.	11½ K.S.	5 K.S.	12 *12-in.*, 16 *4·7-in*, 4 *3-pr*, 8 M.	4 sub.	23·0	1200 3000	...
b.	**Poltava** . .						St. Petersburg (New Admiralty)	1911	..	2,800,000											
a.c.	**Rossia** . . shd.	12,195	480	68½	26	18,420 B.	St. Petersburg	1896	1897	..	10–5 H.S.	2½	4 H.S.	6 H.S.	2 H.S.	2 H.S.	4 *8-in.*, 22 *6-in.*, 31 smaller Q.F. & M.	2	20·0	2500 §	725
b.	**Rostislav, B.S.** . .	8880	341	66½	24	8700	Nicolaieff .	1896	1900	..	15¾–8 H.S.	2–3	5 H.S.	5 H.S.	15¾ H.S.	6 H.S.	4 *10-in.*, 8 *6-in.*, 16 small & M.	2 sub.	16·0	§550 800	624
a.c.	**Rurik** . . .	15,170	490	75	26	19,700 B.	Barrow .	1906	1907	..	6–3 K.S.	1½	3 K.S.	3 K.S.	8 K.S.	7 K.S.	4 *10-in.*, 8 *8-in.*, 20 *4·7-in.*, 14 smaller.	2 sub.	21·0	1200 2000	800
b.	**Sevastopol** . . .	23,000	590½	87	27¼	42,000 Y. tur.	St. Petersburg (Baltic)	1911	..	2,800,000	11–4 K.S.	2	8 K.S.	4 K.S.	11½ K.S.	5 K.S.	12 *12 in.*, 16 *4·7-in.*, 4 *3 pr.*, 8 M.	4 sub.	23·0	1200 3000	...
b.	**Sinope, B.S.** . .	10,180	331	69	26½	13,000 B.	Sebastopol .	1887	1890	900,000	16–11 *comp.*	3	14 *comp.*	12	14 *comp.*	..	6 *12-in.*, 7 *6-in.*, 8 Q.F., 6 M.	7	16·75	886	325
b.	**Slava** . . .	13,516	367½	76	26	16,000 B.	St. Petersburg (Baltic)	1903	1905	..	9–4 K.S.	4	6 K.S.	9 K.S.	10 K.S.	6 K.S.	4 *12-in.*, 12 *6-in.*, 34 *3-in.*, and smaller	2 sub.	18·0	1250 2000	740

† And liquid fuel, 580 tons. § And liquid fuel.

RUSSIA.—Cruising Ships, &c.

(B.S., Black Sea Fleet.)

Class.	NAME	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	ins.				knots.	tons.	
3rd cl. *cr.*	**Almaz**	3285	325	43½	17½	7500 B.	St. Petersburg (Baltic)	1903	1904	..	2¾	5–3½ K.S.	3 *4·7-in.*, 8 *1·8-in.*, 2 *1·4-in.*, 2 M.	6	19·0	560	340
2nd cl *cr.*	**Askold**	5905	426½	49¼	20¾	20,420 T.S	Kiel (Germania)	1900	1901	..	3	4	12 *6-in.*, 12 *3-in.*, 6 *1·8-in.*, 8 smaller Q.F. and M.	6 (2 sub.)	23·8 *t*	720 1100	500
" "	**Aurora**	6731	413¼	55¾	21	11,610 B.	St. Petersburg (Galerny)	1900	1903	..	2½	..	8 *6-in.*, 20 *3-in.*, 8 smaller Q.F. and M.	3 (2 sub.)	20·0	900 1400	422
g.b.	**Bobr**	875	215¼	35¾	9	800	St. Petersburg (New Admiralty)	1907	1908	..	..	..	2 *4·7-in.*, 4 *12-pr.*, 3 M.	1	12·0	60	170
2nd cl. *cr.*	**Bogatyr**	6675	416¾	54½	20¾	19,500 Nor.	Stettin (Vulcan)	1901	1902	..	2	5 N.S.	12 *6-in*, 12 *3-in.*, 6 *1·8-in.*, 8 smaller Q.F. and M.	4 (2 sub.)	24·0 *t*	720 1100	580
" "	**Boutakoff** (Admiral)	7600	519¾	50	18	55,000 C.T	Putiloff	Bldg.	..	..	1	3 side	16 *5·1-in*, 5 *9-pr*, 4 M.	..	32	..	..
" "	**Diana** (Submarine depôt)	6630	413¼	55¾	21	11,610 B.	St. Petersburg (Galerny)	1899	1902	..	2½	..	10 *6-in.*, 20 *3-in.*, 18 smaller Q.F. and M.	3 (2 sub.)	20·0	900 1400	422
g.b.	**Gilyak**	875	215¼	35¾	9	800	St. Petersburg (New Admiralty)	1906	1908	..	..	..	2 *4·7-in.*, 4 *12-pr.*, 3 M.	1	12·0	60	170
2nd cl. *cr.*	**Grieg** (Admiral)	7600	519¾	50	18	55,000 C.T.	Reval	Bldg.	..	..	1	3 side	16 *5·1-in.*, 5 *9-pr.*, 4 M.	..	32	..	..
3rd cl. *cr.*	**Jemchug**	3130	347¾	41½	16	17,000 Y	St. Petersburg (Nevsky)	1903	1904	..	2	..	8 *4·7-in.*, 6 *1·8-in.*, 6 smaller Q.F. and M.	2	23·0	600	340
" "	**Kagul**, B.S. (ex-Otchakoff)	6675	439	54½	20½	19,500 Nor.	Sebastopol	1902	1905	..	2¾	5–3½ K.S.	12 *6-in.*, 12 *3-in.*, 14 smaller	2 sub.	23·0	720 1100	570
to.g.b.	**Kazarsky**, B.S.	400	190	24	8½	3500	Elbing	1890	1891	32,500	..	..	9 *1·8-in.* (Hotchkiss)	2	23·0	90	60

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g.b.	**Koreiets**	875	215¼	35¾	9	800	St. Petersburg (New Admiralty)	1906	1908	..	..	..	2 *4·7-in.*, 4 *12-pr.*, 3 M.	1	12·0	60	170
2nd cl. *cr.*	**Lazareff** (Admiral) B.S.	7600	519¾	50	18	55,000 C.T.	Nikolaieff	Bldg.	..	..	1	3 (side)	16 *5·1-in.*, 5 *9-pr.*, 4 M.	..	32	..	..
"	**Nakhimoff** (Admiral) B.S.																
3rd cl. *cr.*	**Mouravieff Amoursky**	4300	401¾	46	16½	27,400 T.	Elbing (Schichau)	1914	..	..	1	3 (side)	8 *5·1-in.*, 4 *9-pr.*	5	27·5	1000	..
	Nevelskoi (Admiral)																
2nd cl. *cr.*	**Oleg**	6675	439¾	54½	20½	19,500 Nor.	St. Petersburg (New Admiralty)	1903	1904	..	2¾	5–3½	12 *6-in.*, 12 *3-in.*, 14 smaller, Q.F., & M.	2 (sub.)	23·0	600	340
" "	**Pamyat Mercuria**, B.S. (ex-Kagul)	6675	439	54½	20½	19,500	Nicolaieff	1903	1907	..	2¾	5–3½ K.S.	12 *6-in.*, 12 *3-in.*, 14 smaller, Q.F., & M.	2 (sub.)	23·0	720	..
g.b.	**Sivoutch**	875	215¼	35¾	9	800	St. Petersburg (New Admiralty)	1906	1908	..	..	..	2 *4·7-in.*, 4 *12-pr.*, 3 M.	..	12·0	60	170
2nd cl. *cr.*	**Spiridoff** (Admiral)	7600	519¾	50	18	55,000 C.T.	Putiloff	Bldg.	..	..	1	3 (side)	16 *5·1-in.*, 5 *9-pr.*, 4 M.	..	32	..	..
" "	**Svietlana**						Reval										

Okean, *coal transport*, 12,000 tons, 18 knots, launched at Kiel, 1901. Torpedo transports and mining vessels Minin, General Admiral, Gerzog Edinburgski, Volga, **Bakan**, **Yenessei**, **Amur**, Ladoga, Narova, Onega and Prut. Eight river gunboats (946 tons) built for the Amur, Grosa, Shkwal, Shtorm, Taifun, Smertsh, Uragan, Vichrj, Vjuga. Ten 200-ton gunboats for the same service. Gunboats for the Caspian, Kars and Ardagan, completed 1911. Rynda (1885), 3508 tons, training ship. Submarine salvage vessel Volchoff, 2400 tons, 1000 tons lift, Diesel engines, 10 knots.

VOLUNTEER FLEET.—Saratoff, 8556 reg. tons. Petersburg, 9252 reg. tons, Kherson, 10,225 reg. tons, Don, 8430 reg. tons, Kuban, 8480 reg. tons, Smolensk, 11,850 reg. tons, Terek, 7241 reg. tons, all of 18½ or greater speed. Vessels of the Black Sea Shipping Company are available for transport purposes.

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SPAIN.—Armoured Ships.

Class	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position. Heavy Guns.	Second-ary.	Armament. Guns.	Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
b.	**Alfonso XIII.**	15,460	435	78¾	25½	15,300 Y. P. tur.	Ferrol	1913	..	..	9–4 K.S.	2–1	6–5 K.S.	6–3 K.S.	10 K.S.	6 K.	8 *12-in.*, 20 *4-in.*, 2 *3-pr.*, 2 l., 2 M.	3	19·5	800 / 1900	700
a.c.	**Cataluña**	6889	347¾	61	21¾	15,000	Cartagena	1900	1903	600,000	12–10	2	..	12	10½	..	2 *9·4-in.*, 8 *5·5-in.*, 8 *6-pr.*, 2 l.	5 sub.	19·5 t	1200	484
„	**Emperador Carlos V**	9089	380	67	25	18,500	Cadiz (Vea Murguia)	1895	1898	734,000	2	6½–2	2	..	10	2	2 *11-in.* (Hontoria), 8 *5·5-in.*, 4 *3·9-in.*, 2 *2·7-in.*, 4 *2·2-in.*, 6 M.	6	20·0	1200	535
b.	**España**	15,460	435	78¾	25½	15,300 Y. P. tur.	Ferrol	1912	1913	..	9–4 K.S.	2–1	6–5 K.S.	6–3 K.S.	10 K.S.	6 K.	8 *12-in.*, 20 *4-in.*, 2 *3-pr.*, 2 l., 2 M.	3	20·0 t 19·5	800 / 1900	700
b.	**Jaime I.**							Bldg.	..												
b.	**Pelayo**	9744	330	66	25	9000 Nic.	La Seyne	1887	1890 1897	..	17¾	4	..	..	19½	4 H.S.	2 *12·5-in.*, 2 *11-in.*, 9 *5·5-in.*, 6 smaller, 12 M.	7	16·0	800	600
a.c.	**Princesa de Asturias**	6889	347¾	61	21¾	15,000	Carraca	1896	1902	600,000	12–10	2	..	12	10½	..	2 *9·4-in.*, 10 *5·5-in.*, 8 *6-pr.*, 2 l.	5	18·0	1200	500

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SPAIN.—Cruising Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	ins.				knots.	tons.	
g.b.	**Bonifaz**	800	200	30	..	1100 Y	Cartagena	1912	1913	..	..	..	4 *3-in.*, 2 M.	..	13·0	..	..
to.g.b.	**Don Alvaro de Bazán**	810	233	26¾	22	2500	Ferrol	1897	1899	..	..	..	2 *4·7-in.* (Hontoria), 4 *1·6-in.*, 2 M.	4	19·0	..	110
”	**Doña María de Molina**	810	233	26¾	22	2500	Ferrol	1896	1898								
cr.	**Extremadura**	2030	290	36	14	7000 T	Cadiz	1900	1902	..	2	..	8 *4-in.* (Vickers), 4 *2·2-in.*, 2 *1·4-in.*, 1 L	..	20·0	430	246
g.b.	**Lauria**	800	200	30	..	1100 Y	Cartagena	1912	1913	..	..	..	4 *3-in.*, 2 M.	..	13·0	..	..
”	**Laya**																
to.g.b.	**Marqués de la Victoria**	810	233	26¾	22	2500	Ferrol	1897	1900	..	..	..	2 *4·7-in.* (Hontoria), 4 *1·6-in.*, 2 M.	4	19·0	..	110
g.b.	**Recalde**	800	200	30	..	1100 Y	Cartagena	1911	1912	..	..	..	4 *3-in.*, 2 M.	..	13·0	..	..
cr.	**Reina Regente**	5287	337	529	19¾	6500 W.T.	Ferrol	1906	1908	..	..	3	10 *5·5-in.*, 12 *2·2-in.*, 2 l., 8 M.	3	20·0	1200	497
”	**Rio de la Plata** shd.	1773	246	35½	15	7100 N.S.	Havre	1898	1899	..	..	1	2 *5·5-in.*, 4 *3 9-in.*, 4 *2·2-in.*, 6 M.	2	20·0	270	213

Hernán Cortés, Vasco Nuñez de Balboa, Marqués de Molins, Ponce de Léon, MacMahon, Perla, Nueva España and Temerario, gun-vessels.

SWEDEN.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Secondary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
c.d.s., t.	**Aeran** . .	3612	287	49¼	16½	6500 Y.	Gothenburg	1901	1902	..	7 K.S.	1⅞	..	..	7½ K.S.	5 K.S.	2 *8·2-in.*, 6 *5·9-in.*, 10 *2·2-in.*, 2 *1·4-in.*, 2 M.	2 sub.	17·2 *t*	370	250
„	**Dristigheten** .	3445	285	48½	16	5400 Y	Gothenburg	1900	1901	..	8 K.S.	1⅞	..	..	8 N.S.	3¾ K.S.	2 *8·2-in.*, 6 *5·9-in.*, 10 *2·2-in.*, 2 M.	2 sub.	16·5	300	250
a.c.	**Fylgia** . .	4100	377¼	48¾	16	12,440 Y. *t*	Stockholm .	1905	1907	385,700	4 K.S.	2	..	..	5 K.S.	5 K.S.	8 *5·9-in.*, 14 *2·2-in.*, 3 *1·4-in.* .	2	22·5 *t*	350 900	321
c.d.s., t.	**Göta** . .	3238	258½	48	16¾	4750	Gothenburg	1890	1891	..	11¾–8	2	..	..	7½ H.S.	5 H.S.	1 *8·2-in.*, 7 *5·9-in.*, 11 *2·2-in.*, 2 *1·4-in.*	3	16·0	240	150
„	**Manligheten** .	3612	287	49¼	16½	7400 Y.	Malmö .	1902 1904	1906	..	7 K.S.	1⅞	..	..	7½ K.S.	5 K.S.	2 *8·2-in.*, 6 *5·9-in.*, 10 *2·2-in.*, 2 *1·4-in.*, 2 M.	2 sub.	17·0	370	250
„	**Njord** . .	3445	278¼	48½	17½	5350	Gothenburg	1898	1899	..	9½ H.N.S.	1⅞	..	..	9⅞ H.N.S.	4 H.N.S.	2 *9·8-in.*, 6 *4·7-in.*, 10 *2·2-in.*, 4 M.	1	16·5	275	200
„	**Oden** . . .	3445	278¼	48½	17½	5330	Stockholm .	1896	1898	..	9½ H.N.S.	1⅞	..	..	9⅞ H.N.S.	4 H.N.S.	2 *9·8-in.*, 4 *4·7-in.*, 10 *2·2 in.*, 4 M.	1	16·5	275	200
„	**Oscar II** . .	4203	313¾	49½	16¾	8500 Y.	Gothenburg	1905	1907	..	6 K.S.	2	6 K.S.	6 K.S.	7½ K.S.	5 K.S.	2 *8·2-in.*, 8 *5·9-in.*, 10 *2·2-in.*, 2 *1·4-in.*, 2 M.	2 sub.	18·0	350 500	326
„	**Svea** . .	3051	248¼	49¼	17	3640	Gothenburg	1886	1887	..	11¾–8	2	..	..	7½ H.S.	5 H.S.	1 *8·2-in.*, 7 *5·9-in.*, 11 *2·2-in.*, 2 *1·4-in.*	1	14·7 *t*	220	268
a c.	**Sverige** . .	7100	390½	61	21½	20,000 tur. Y.	Stockholm .	1904 Bldg.	..	666,000	8–6 K.S.	1½	4 K.S.	..	8 K.S.	5 K.S.	4 *11-in.*, 8 *6-in.*, 6 *12-pr.*, 4 *1-pr.*	2 sub.	22·0	350 800	450
c.d.s., t.	**Tapperheten** .	3612	287¼	49¼	16½	6000 Y.	Malmö .	1901	1904	..	7 K.S.	1⅞	..	..	7½ K.S.	5 K.S.	2 *8·2-in.*, 6 *5·9-in.*, 10 *2·2-in.*, 2 *1·4-in.*, 2 M.	2 sub.	16·5	370	250
„	**Thor** . . .	3445	278¼	48½	17½	5350	Stockholm .	1898	1890	..	9½ H.N.S.	1⅞	..	..	9⅞ H.N.S.	3¾ H.N.S.	2 *9·8-in.*, 6 *4·7-in.*, 10 *2·2-in.*, 4 M.	1	16·5	275	200
„	**Thule** . .	3248	260¾	48	16¾	4740	Stockholm .	1892	1894	..	11¾–8	1⅞	..	..	7½ H.S.	5 H.S.	1 *8·2-in.*, 7 *5·9-in.*, 11 *2·2-in.*, 2 *1·4-in.*	2	16·2 *t*	250	165
„	**Wasa** . .	3612	287	49¼	16½	6000 Y.	Stockholm .	1904 1901	1893	..	7 K.S.	1⅞	..	..	7½ K.S.	5 K.S.	2 *8·2-in.*, 6 *5·9-in.*, 10 *2·2-in.*, 2 *1·4-in.*, 2 M.	2 sub.	16·5	370	250

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SWEDEN.—Cruising Ships, &c.

Class.	NAME	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.										knots.	tons.	
to.g.b.	**Claes Horn**	787	222	27	10¼	3600	Stockholm	1899	1900	..	..	..	2 *4·7-in.*, 4 *2·2-in.*	1 sub.	20·0	120	110
”	**Claes Uggla**	787	232	27¼	8¾	4500 Y.	Stockholm	1900	1901	..	..	..	2 *4·7-in.*, 4 *2·2-in.*	1	20·5	120	110
to.g.b.	**Jacob Bagge**	787	222	27	10¼	3970	Malmö	1898	1899	..	..	..	2 *4·7-in.*, 4 *2·2-in.*	1 sub.	19·5	120	110
	Örnen					4100	Gothenburg	1896	1897						19·5		
”	**Psilander**	787	232	27¼	8¾	4500 Y.	Stockholm	1900	1901	..	..	..	2 *4·7-in.*, 4 *2·2-in*	1 sub.	20·5	120	110

Four gunboats of 190 to 200 tons, and about 130 I.H.P. each, and carrying 1 5-in. B.L.R. and 2 M.

TURKEY.—Armoured Ships.

Class	NAME	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Second-ary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
c.b.	**Assar-i-Tewfik** .	4613	272¼	52½	25	3560	La Seyne .	1868	1870 1906	..	8	..	..	..	6	..	3 *5·9-in.*, 7 *4·7-in.*, 6 *6-pr.* .	..	13·0	400	300
b.	**Birindji Osman** (Osman I.) ex Rio de Janeiro	27,500	637	89	27	32.000 B.& W. P. tur.	Elswick .	1913	..	..	9–4 K.S.	2–1	6 K.S.	6 K.S.	9 K.S.	6 K.S.	14 *12-in.*, 20 *6-in*, 10 *12-pr.* .	3 sub.	22·0	1500 / 3000 oil 500	1100
b.	**Kheyr-ed-Din Barbarossa** *	9901	354¼	65	24¾	9000	Wilhelms-haven	1891	1894	450,000	15¾ *comp.*	2½	..	..	11¾ *comp.*	1½	6 *11-in.*, 8 *4·1-in.*, 8 *3·4-in.*, 4 M.	3	17·0	630 1000	..
b.	**Messoudieh** . .	9120	331½	59	25¾	11,000 Nic.	Thames Genoa .	1874	1876 1901	..	12	1	12	..	6–9	12	2 *9·2-in.*, 12 *6-in.*, 14 *3-in.*, 10 *6-pr.*; 2 *3-pr.*, 2 l.	..	17·5 t	1100	600
b.	**Reshadieh** . .	23,000	525	91	..	31,000 P. tur.	Barrow .	1913	..	..	12–6 K.S.	3	9–8 K.S.	12 K.S.	12 K.S.	5 K.S.	10 *13·5-in.*, 16 *6-in.* . .	5 sub.	21·0	..	..
b.	**Turgut Reis** † . .	9901	354¼	65	24¾	9000	Stettin (Vulcan)	1891	1893	450,000	15¾ *comp.*	2½	..	..	11¾ *comp.*	1½	6 *11-in.*, 8 *4·1-in.*, 8 *3·4-in.*, 4 M.	3	17·0	630 1000	..

Another battleship is to be built in England.

* Ex Kurfürst Friedrich Wilhelm. † Ex Weissenburg.

TURKEY—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
to. cr.	**Berk-i-Satvet**	740	262½	27½	..	5100	Kiel (Germania)	1906	1907	..	..	..	2 *4-in.*, 6 *6-pr.*, 2 M., 2 l.	3	22	240	..
cr.	**Hamidieh**	3800	340	47½	16	12,500 Nic.	Elswick	1903	1904	..	4–1½	..	2 *6-in.*, 8 *4·7-in.*, 6 *1·8-in.*, 6 M.	2	22·2 *t*	600	300
to. cr.	**Heibetnuma**	1960	226	37	14	2500 ind.	Turkey	1890	1893	..	..	..	3 *5·9-in.* (K.), 6 *4·7-in.*, 6 Q.F.	2	14·0	..	..
g.v.	**Lutfi-Hamayoun**	1313	210	35	14	2800	Turkey	1892	1894	..	..	..	4 *6-in.* (K.), 6 *4·7-in.*, 6 Q.F.	2	13·0	..	..
cr.	**Medjidieh**	3432	331½	42	16	12,000 Nic.	Philadelphia	1903	1904	..	4–1½	..	2 *6-in.*, 8 *4·7-in.*, 6 *1·8-in.*, 6 M.	2	22·2	600	300
to. cr.	**Peik-i-Shevket**	740	262½	27½	..	5100	Kiel (Germania)	1906	1907	..	..	..	2 *4-in.*, 6 *6-pr.*, 2 M., 2 l.	3	22	240	..
„	**Pelenk-i-deria**	840	236½	31	15½	5000	Kiel (Germania)	1890	1891	..	..	½	2 *4-in.* (K.), 16 M.	2	20·0	..	111

Seven 14-knot gunboats (510–420 tons) built in France (1912–13). About 20 other gunboats of various classes.
Mine-layer Nusrat, 380 tons, 15 knots, built Germania Yard, Kiel, 1912. Two scouts are to be built by Messrs. Armstrong on the Tyne, with engines from Barrow.

UNITED STATES.—Armoured Ships.

Class	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost. *	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Second-ary.	Armament. Guns	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
b.	Alabama.	11,565	368	72¼	26	11,207 t	Philadelphia	1898	1900	544,539	16½–4 H.S.	2¾–4	5¼ H.S.	12 H.S.	15 H.S.	6 H.S.	4 *13-in.*, 14 *6-in.*, 16 *6-pr.*, 2 *1-pr.*, 4 M., 2 l.	..	17·0 t	800 1275	592
b.	Arkansas	26,000	554	93¼	28½	28,533 P. tur.	Camden, N.J.	1911	1912	964,000	11–5 K.S.	3	..	8–6 K.S.	11 K.S	6½	12 *12-in.*, 21 *5-in.*, 4 *3-pr.*, 2 M., 2 l.	2 (sub.)	21·0 t	1650 2500	1115
a. c.	Brooklyn.	9215	400½	62	26¼	18,425 t	Philadelphia	1895	1896	613,583	3 H.S.	6–3	4 H.S.	..	8 H.S.	5½ H.S.	8 *8-in.*, 12 *5-in.*, 12 *6-pr.*, 4 *1-pr.*, 4 M., 2 l.	..	22·2 t	900 1622	718
,,	California	13,680	502	69½	24½	29,381 t B. & W.	S. Francisco	1904	1907	756,000	6–3½ K.S.	4	5 K.S.	4 K.S.	6 K.S.	5 K.S.	4 *8-in.*, 14 *6-in.*, 18 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	2 (sub.)	22·2 t	900 2000	829
,,	Charleston	9700	424	66	25½	27,500 B.&W.	Newport News	1904	1906	563,030	4 H.S.	3	4 H.S.	..	4 H.S.	..	14 *6-in.*, 18 *3-in.*, 12 *3-pr.*, 12 *1-pr.*, 10 M., 2 l.	..	22·0	650 1500	664
,,	Colorado.	13,680	502	69½	24½	26,837 Nic.	Philadelphia	1903	1905	756,000	6–3½ K.S.	4	5 K.S.	4 K.S.	6 K.S.	5 K.S.	4 *8-in.*, 14 *6-in.*, 18 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	2 (sub.)	22·2 t	900 2000	829
b.	Connecticut	16,000	450	76¾	26¾	20,525 B. & W.	Camden, N.J.	1904	1906	819,300	11½ K.S.	3	8 K.S.	7 K.S.	10 K.S.	7 K.S.	4 *12-in.*, 8 *8-in.*, 12 *7-in.*, 20 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	4 (sub.)	18·8 t	900 2206	803
b.	Delaware	20,000	510	85¼	27	29,025	Newport News	1909	1910	817,300	11 K.S.	..	10–8 K.S.	..	11 K.S.	5 K.S	10 *12-in.*, 14 *5-in.*, 2 *3-pr.*, 2 l., 12 M.	2 (sub.)	21·5 t	1000 2500	927
b.	Florida	21,825	510	88¼	27	27,036 tur.	New York	1910	1911	1,280,000	11	..	10	..	11	5	10 *12-in.*, 16 *5-in.*, 4 *3-pr.*, 4 M., 2 l.	2 (sub.)	21·0	1000 2300	1014
Super-posed turrets.	Georgia	14,948	435	76¼	23¾ †	25,088 t Nic.	Bath, Me.	1904	1906	737,700	11–4 K.S.	3	6 K.S.	6 K.S.	11 K.S.	6 K.S.	4 *12-in.*, 8 *8-in.*, 12 *6-in.*, 12 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	4 (sub.)	19·2 t	900 1704	812
b.	Idaho	13,000	375	77	25	14,235 B. & W.	Philadelphia	1905	1908	616,360	9–4 K.S.	3–1½	7 K.S.	7 K.S.	10–7½ K.S.	6 K.S.	4 *12-in.*, 8 *8-in.*, 8 *7-in.*, 12 *3-in.*, 6 *3-pr.*, 4 *1-pr.*, 8 M., 2 l.	2 (sub.)	17·2 t	600 1750	725
b.	Illinois	11,565	368	72¼	26	12,757	Newport News	1898	1901	533,237	16½–4 H.S.	2¾–4	5¼ H.S.	12 H.S.	15 H.S.	6 H.S.	4 *13-in.*, 14 *6-in.*, 16 *6-pr.*, 6 *1-pr.*, 4 M., 2 l.	1 (sub.)	17·45 t	800 1275	686
b	Iowa	11,340	360	72¼	26¾	11,933	Philadelphia	1896	1897	618,514	14 H.S.	2¾	5 H.S.	12 H.S.	15 H.S.	8–6 H.S.	4 *12-in.*, 8 *8-in.*, 10 *4-in.*, 4 *6-pr.*, 6 M., 2 l.	..	17·1 t	625 1795	520

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„	**Kansas** .	16,000	450	77	26¾	19,545 B. & W.	Camden, N.J.	1905	1907	855,850	8–11 K.S.	3–4½	8 K.S.	7 K.S.	10 K.S.	7 K.S.	4 *12-in.*, 8 *8-in.*, 12 *7-in.*, 20 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	4 (sub.)	18·1 t	900 2200	854
super-posed turrets	**Kearsarge** **Kentucky**	11,520	368	72¼	25¾	11,788 12,179	Newport News	1898	1899	462,345 each	16½–4 H.S.	2¾–5	5½ H.S.	..	15 H.S.	9 H.S.	4 *13-in.*, 4 *8-in.*, 18 *5-in.*, 18 small L. and M.	1 ..	16·8 16·9 t	410 1591	690 686
b.	**Louisiana** .	16,000	450	76¾	26¾	20,748 B. & W.	Newport News.	1904	1906	819,300	11–8 K.S.	3	8 K.S.	7 K.S.	10 K.S.	7 K.S.	4 *12-in.*, 8 *8-in.*, 12 *7-in.*, 20 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 L.	4	18·8 t	900 2200	803
„	**Maine** .	12,500	388	72¼	25½	15,693 Nic.	Philadelphia	1901	1902	592,828	11–4 K.S.	2¾–4	6 K.S.	10 K.S.	12 K.S.	6 K.S.	4 *12-in.*, 16 *6-in.*, 6 *3-in.*, 8 *3-pr.*, 6 *1-pr.*, 2 M., 2 l.	2 sub.	18·0 t	1000 1800	551
a.c.	**Maryland** .	13,680	502	69½	24½	28,059 B. & W.	Newport News.	1903	1905	756,400	6–3½ K.S.	4	5 K.S.	4 K.S.	6 K.S.	5 K.S.	4 *8-in.*, 14 *6-in.*, 18 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	2 sub.	22·4 t	900 1850	829
b.	**Michigan** .	16,000	450	80¼	24½	16,310 B. & W.	Camden, N.J.	1908	1909	700,000	11–9	3	8	10	10–8	8	8 *12-in.*, 22 *3-in.*, 2 *3-pr.*, 12 M., 2 l.	2 sub	18·8 t	900 2200	669
a.c.	**Milwaukee** .	9700	424	63	25½	24,166 W.T.	S. Francisco.	1904	1906	580,500	4 H.N.S.	3	4 H.N.S.	..	4 H.N.S.	..	14 *6-in.*, 18 *14-pr.*, 12 *3-pr.*, 12 *1-pr.*, 10 M., 2 l.	2 sub.	22·2 t	650 1500	664
b.	**Minnesota** .	16,000	450	77	26¾	20,235 B. & W.	Newport News	1905	1907	844,500	8–11 K.S.	3–4½	8 K.S.	7 K.S.	10 K.S.	7 K.S.	4 *12-in.*, 8 *8-in.*, 12 *7-in.*, 20 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	4 sub.	18·8 t	900 2200	881
„	**Mississippi** .	13,000	375	77	24¾	13,607 B. & W.	Philadelphia	1905	1908	616,360	9–4 K.S.	3–1½	7 K.S.	7 K.S.	10–7½ K.S.	6 K.S.	4 *12-in.*, 8 *8-in.*, 8 *7-in.*, 12 *3-in.*, 6 *3-pr.*, 4 *1-pr.*, 8 M., 2 l.	2 sub.	17·11 t	600 1750	725
„	**Missouri** .	12,500	388	72¼	25½	15,845 T.	Newport News	1901	1903	592,828	12–4 K.S.	2¾–4	6 K.S.	10 K.S.	12 K.S.	6 K.S.	4 *12-in.*, 16 *6-in.*, 6 *3-in.*, 8 *3-pr.*, 4 *1-pr.*, 2 M., 2 l.	2 sub.	18·1 t	1000 1836	551
a.c.	**Montana** .	14,500	502	72¾	25	27,938 B & W	Newport News	1906	1908	970,630*	5–3 K.S.	3	5 K.S.	6 K.S.	9 K.S.	5 K.S.	4 *10-in.*, 16 *6-in.*, 22 *3-in.*, 12 *3-pr.*, 4 *1-pr.*, 4 M., 2 l.	4 sub.	22·2 t	900 2000	845
Super-posed turrets.	**Nebraska** .	14,948	435	76¼	23¾ †	21,283 B. & W.	Seattle.	1904	1907	767,21[illegible]	11–4 K.S.	3	6 K.S.	6 K.S.	11 K.S.	6 K.S.	4 *12-in.*, 8 *8-in.*, 12 *6-in.*, 12 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	4 sub.	19·1 t	900 1900	812
b.	**Nevada**	27,500	575	95	28½	35,000 Cur. tur	Quincy, Mass.	Bldg.	..	2,200,000	13½–8 K.S	1½–3	13½–8 K.S.	13½ K.S.	18–16 K.S.	5 K.S.	10 *14-in.*, 21 *5-in.*, 10 small l. & M.	4 sub	20·5	1300 2000	..
b.	**NewHampshire**	16,000	450	77	26¾	19,100 B. & W.	Camden, N.J.	1906	1908	1,600,000 (Total)	9–4 K.S.	3	7 K.S.	7 K.S.	12 K.S.	7 K.S.	4 *12-in.*, 8 *8-in.*, 12 *7-in.*, 12 *3-in.*, 12 *3-pr.*, 4 *1-pr.*, 4 M., 2 l.	4 sub.	18·2 t	900 2350	916
Super-posed turrets.	**New Jersey** .	14,948	435	76¼	23¾ †	23,089 B. & W.	Quincy, Mass.	1904	1906	699,680	11–4 K.S.	3	6 K.S.	6 K.S.	11 K.S.	6 K.S.	4 *12-in.*, 8 *8-in.*, 12 *6-in.*, 12 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	4 sub.	19·4 t	900 1900	812
b.	**New York** .	27,000	573	95¼	28½ †	35,000	New York .	1912	..	..	12–4 K.S.	3	9 K.S.	10 K.S.	14–8 K.S.	6 K.S.	10 *14-in.*, 21 *5-in.*, 10 small l. & M.	4 sub.	21·0	2200 2850	1014

* The sums given in this column are exclusive of the cost of armour and armament according to the system of making appropriations in the estimates.   † Mean draught.

UNITED STATES.—Armoured Ships—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost. *	Armour. Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position. Heavy Guns.	Second-ary.	Armament. Guns.	Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
		tons	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
a.c.	**North Carolina**	14,500	502	72¾	25	29,785 B. & W.	Newport News	1906	1908	970,630‡	5–3 K.S.	3	5 K.S.	9 K.S.	9 K.S.	5 K.S.	4 *10-in.*, 16 *6-in.*, 22 *3-in.*, 12 *3-pr.*, 4 *1-pr.*, 4 M., 2 l.	4 sub.	22·48 *t*	900 2000	845
b.	**North Dakota** .	20,000	510	85	27	31,826 Cur. tur	Quincy, Mass.	1908	1910	899,500	11 K.S.	..	10–8 K.S.	..	11 K.S.	5 K.S.	10 *12-in.*, 14 *5-in.*, 2 *3-pr.*, 2 l., 12 M.	2 sub.	21·6 *t*	1000 2500	960
b.	**Ohio** . .	12,500	388	72¼	25½	16,220 T.	S. Francisco.	1901	1904	595,705	11·4 K.S.	3–4	6 K.S.	10 K.S.	12 K.S.	6 K.S.	4 *12-in.*, 16 *6-in.*, 6 *3-in.*, 8 *3-pr.*, 6 *1-pr.*, 2 M., 2 l.	2 sub.	17·8 *t*	1000 2144	521
b.	**Oklahoma** .	27,500	575	95	28½	35,000	New York .	1914	..	2,200,000	13½–8 K.S.	1½–3	13½–8 K.S.	13½ K.S.	18–16 K.S.	5 K.S.	10 *14-in.*, 21 *5-in.*, 10 small l. & M.	4 sub.	20·5	1300 2000	..
b.	**Pennsylvania** **No. 39** .	31,400	600	97	28¾	31,500 *t* Y.	Newport News New York	Bldg	..	1,485,000	14 K.S.	..	..	..	18 K.S.	..	12 *14-in.*, 22 *5-in.*, 10 small l. & M.	4 sub	21·0	2914	..
a.c.	**Pittsburg** .	13,680	502	69½	24½	28,600 Nic.	Philadelphia	1903	1905	799,340	6–3½ K.S.	4	5 K.S.	4 K.S.	6 K.S.	5 K.S.	4 *8-in.*, 14 *6-in.*, 18 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	2 sub.	22·4 *t*	900 2000	829
Super-posed	**Rhode Island** .	14,948	435	76¼	23¾ †	20,310 B. & W.	Quincy, Mass.	1904	1906	699,680	11–4 K.S.	3	6 K.S.	6 K.S.	11 K.S.	6 K.S.	4 *12-in.*, 8 *8-in.*, 12 *6-in.*, 12 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	4 sub.	19·0 *t*	900 1900	812
a.c.	**Saratoga** . (*ex* New York)	8200	380½	64¾	27¼	17,075	Philadelphia	1891	1893 1909	613,377	4 H.S.	2½	.. K.S.	..	6½ H.S.	5–4 H.S.	4 *8-in.*, 10 *5-in.*, 8 *12-pr.*, 4 *3-pr.*, 4 M.	..	21·0 *t*	750 1334	498
a.c.	**St. Louis** .	9700	424	66	25½	27,264 B. & W.	Philadelphia (Cramp)	1905	1906	563,030	4 K.S.	3	4–3	..	4 K.S.	..	14 *6-in.*, 18 *14-pr.*, 12 *3-pr.*, 12 *1-pr.*, 10 M., 2 l.	..	22·3 *t*	650 1500	664
b.	**South Carolina**	16,000	450	80¼	24½	18,357 B. & W.	Philadelphia (Cramp)	1908	1909	700,000	11–9	3	8	10	10–8	8	8 *12-in.*, 22 *3-in.*, 2 *3-pr.*, 12 M., 2 l.	2 sub.	18·9 *t*	900 2200	669
a.c.	**South Dakota** .	13,680	502	69½	24½	28,598 B. & W.	S. Francisco.	1904	1907	770,570	6–3½ K.S.	4	5 K.S.	4 K.S.	6 K.S.	5 K.S.	4 *8-in.*, 14 *6-in.*, 18 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	2 sub.	22·0 *t*	900 2000	829
a.c.	**Tennessee** .	14,500	502	72¾	25	26,963 B. & W.	Philadelphia	1904	1906	970,630‡	5–3 K.S.	3	5 K.S.	6 K.S.	9 K.S.	5 K.S.	4 *10-in.*, 16 *6-in.*, 22 *3-in.*, 12 *3-pr.*, 4 *1-pr.*, 8 M., 2 l.	4 sub.	22·1 *t*	900 2000	858
b.	**Texas** . .	27,000	573	95¼	28½	28,100 *t*	Newport News	1912	1914	1,166,000	12–4 K.S.	3	9 K.S.	10 K.S.	14–8 K.S.	6 K.S.	10 *14-in.*, 20 *5-in.*, 10 small .	4 sub.	21·1 *t*	2200 2850	1014

b.	**Utah** .	. 21,825	510	88¼	28½	28,477 t., P. tur.	Camden, N.J.	1909	1911	813,500	11	..	10	..	11	5	10 *12-in.*, 16 *5-in.*, 4 *3-pr.*, 4 M., 2 l.	2 sub.	21·6 t	1000 / 2300	1014
t.	**Vermont** .	. 16,000	450	77	26¾	17,982 B. & W.	Quincy, Mass.	1905	1907	858,730	8-11 K.S.	3-4½	8 K.S.	7 K.S.	10 K.S.	7 K.S.	4 *12-in.*, 8 *8-in.*, 12 *7-in.*, 20 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	4 sub.	18·33 t	900 / 2200	854
Superposed	**Virginia** .	. 14,948	435	76¼	23¾ †	22,841 Nic.	Newport News	1904	1906	737,700	11-8	3	6 K.S.	6 K.S.	11 K.S.	6 K.S.	4 *12-in.*, 8 *8-in.*, 12 *6-in.*, 12 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	4 sub.	19·0 t	900 / 1900	812
a.c.	**Washington**	. 14,500	502	72¾	27	27,152 B. & W.	Camden, N.J.	1905	1906	970,630‡	5-3 K.S.	3	5 K.S.	6 K.S.	9 K.S.	5 K.S.	4 *10-in.*, 16 *6-in.*, 22 *3-in.*, 12 *3-pr.*, 4 *1-pr.*, 8 M., 2 l.	4 sub.	22·3 t	900 / 2000	858
,,	**West Virginia**	13,680	502	69½	24½	31,437 B. & W.	Newport News	1903	1905	798,310	6-3½ K.S.	4	5 K.S.	12 H.S.	6 K.S.	5 K.S.	4 *8-in.*, 14 *6-in.*, 18 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	2 sub.	22·1 t	900 / 2000	829
t.	**Wisconsin**	. 11,653	368	72¼	26	12,452	S. Francisco.	1898	1901	549,666	16½-4 H.S.	3-4	5½ H.S.	..	15 H.S.	6 H.S.	4 *13-in.*, 14 *6-in.*, 16 *6-pr.*, 6 *1-pr.*, 4 M., 2 l.	1	17·2 t	800 / 1310	583
b.	**Wyoming**	. 26,000	554	93¼	28½	31,437 P. tur.	Philadelphia	1911	1912	963,800	11-9 K.S.	..	..	8-6 K.S.	11 K.S.	8	12 *12-in.*, 21 *5-in.*, 4 *3-pr.*, 2 M., 2 l.	2 sub.	21·2 t	1650 / 2500	1115

Also the monitors Puritan, 6060 tons, Amphitrite, Miantonomoh, Monadnock, and Terror, 3990 tons, Tonopah (*ex* Nevada), 3714 tons, Tallahassee (*ex* Florida) and Ozark (*ex* Arkansas), 3235 tons, Cheyenne (*ex* Wyoming), 3218 tons, Monterey, 4084 tons, and the second-class battleship Texas, 6315 tons.

* See note on page 255. † Mean draught. ‡ Including armour, but not armament.

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UNITED STATES.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.*	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
3rd cl. *cr.*	**Albany** . shd.	3487	345	43¾	20	7500	Elswick .	1899	1900	247,611	3	3–1½ shields	10 *5-in.*, 10 *3-pr.*, 12 *1-pr.*, 2 M., 1 l.	..	20·5 *t*	512 747	356
scout .	**Birmingham** .	3750	420	46¾	17	15,670 Express	Quincy, Mass.	1907	1908	301,000	2–1½	..	2 *5-in.*, 6 *3-in.* . . .	2 sub.	24·3 *t*	1250	356
3rd cl. *cr*	**Chattanooga** shd. .	3200	292	44	16¾	5303 B. & W.	Elizabeth Port	1903	1904	212,325	2	..	10 *5-in.*, 8 *6-pr.*, 2 *1-pr.*, 4 M., 1 l.	..	16·65 *t*	470 700	302
scout .	**Chester** . .	3750	420	46¾	17	16,000 Nor. turb.	Bath, Me. .	1907	1908	337,000	2–1½	..	2 *5-in.*, 6 *3-in.* . . .	2 sub.	26·5 *t*	1250	356
,, ,,	**Cincinnati** . .	3213	300	42	20¼	8,490 B. & W.	Brooklyn .	1892	1894	226,055	2½	4	11 *5-in.*, 8 *6-pr.*, 2 *1-pr.*, 2 M.	..	19·0	350 468	314
3rd cl. *cr.*	**Cleveland** . shd. .	3200	292	44	16¾	4640 B. & W.	Bath, Me. .	1901	1903	212,325	2	..	10 *5-in.*, 8 *6-pr.*, 2 *1-pr.*, 4 M., 1 l.	..	16·4 *t*	470 700	302
2nd cl. *cr.*	**Columbia** . .	7350	412	58¼	25¼	18,509	Philadelphia	1892	1894	559,950	4–2½	4 shield	1 *8-in.*, 2 *6-in.*, 8 *4-in.*, 12 *6-pr.*, 2 *1-pr.*, 2 M., 1 l.	..	22·8 *t*	750 1670	477
3rd cl. *cr.* ,,	**Denver** . **Des Moines** } shd. {	3200 }	292	44	16¾	4135 B. & W.	{ Philadelphia Quincy, Mass. }	1902	1904	212,325	2	..	10 *5-in.*, 8 *6-pr.*, 2 *1-pr.*, 4 M., 1 l.	..	16·75	470 700	303
g.v.	**Dubuque** . .	1085	174	35	13	1193 B. & W.	Morris Heights, N.Y.	1904	1905	..	..	..	6 *4-in.*, 4 *6-pr.*, 2 *1-pr.*, 2 M.	..	12·9	200	162
3rd cl. *cr.*	**Galveston** . shd.	3200	292	44	16¾	5073 B. & W.	Richmond, Va.	1903	1904	212,325	2	..	10 *5-in.*, 8 *6-pr.*, 2 *1-pr.*, 4 M., 1 l.	..	16·4	470 700	302

* Prices exclusive of armament.

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2nd cl. *cr.*	**Minneapolis** .	tons. 7350	ft. 412	ft. 58¼	ft. 25½	20,862	Philadelphia	1893	1894	£ 552,754	in. 4–2½	in. 4 shield	1 *8-in.*, 2 *6-in.*, 8 *4-in.*, 12 *6-pr.*, 2 *1-pr.*, 2 M., 1 l.	..	knots. 23·0 *t*	tons. 750 / 1200	477
3rd cl. *cr.*	**New Orleans** shd.	3487	346	43¾	19¾	7500	Elswick	1896	1898	293,684	..	3–1¼ shields	10 *5-in.*, 10 *3-pr.*, 2 *1-pr.*, 2 M., 1 l.	..	20·0	512 / 767	366
g.v.	**Paducah** .	1085	174	35	13	1000 B.&W.	Morris Heights, N.Y.	1904	1905	..	..	..	6 *4-in.*, 4 *6-pr.*, 2 *1-pr.*, 2 M.	..	12·0	200	162
3rd cl. *cr*	**Raleigh** .	3213	300	42	20¼	8500 B.&W.	Norfolk	1892	1894	226,055	2½	4	11 *5-in.*, 8 *6-pr.*, 2 *1-pr.*, 2 M., 1 l.	..	19·0	350 / 460	313
scout	**Salem** .	3750	420	46¾	18¼	22,242 W.T. turb.	Quincy, Mass.	1907	1908	301,000	2–1½	..	2 *5-in.*, 6 *3-in.*	2 sub.	25·9 *t*	1250	356
3rd cl. *cr.*	**Tacoma** . shd.	3200	292	44	16¾	5288 B.&W.	S. Francisco	1903	1904	212,325	..	2 shields	10 *5-in.*, 8 *6-pr.*, 2 *1-pr.*, 4 M., 1 l.	..	16·6 *t*	470 / 700	302

Third class cruisers Baltimore, Concord, Yorktown, Boston, Atalanta, Newark, and San Francisco, the last named converted into a mine-layer. Gun vessels Helena, Marietta, Nashville, Princeton, Vicksburg, Wheeling, and Wilmington, 1000 to 1392 tons, launched 1895–97. Fleet colliers Prometheus, Erie, Ontario and Vestal (12,500 tons); Cyclops, Jason, Jupiter, Neptune, Nereus, Orion and Proteus. 1935 tons. Two large oil-transports, Kanawha and Maumee, are being built. Gunboat, Sacramento, 1500 tons, 3 *4-in.*, 2 *3-pr.* guns, 15 knots, is completing. Torpedo depôt Castine, 1177 tons.

Training ships, Olympia, 5870 tons; Chicago, 4500 tons; Marblehead, 2089 tons. Torpedo experimental vessel, Montgomery, 2089 tons.

The ocean liners St. Louis and St. Paul, 11,629 tons, New York and Philadelphia, 10,802 tons, 20 knots (International Navigation Co.), and the Korea and Siberia, 11,200 tons, 18 knots (Pacific Mail Steamship Co.) are enrolled auxiliary cruisers. Niagara, submarine tender; Bushnell in hand.

* **Prices exclusive of armament.**

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SHIPS BELONGING TO POWERS WHOSE NAVIES ARE OF LESSER IMPORTANCE.

Bulgaria.—Eleven steamers of small size, of which one is used as the Prince's yacht. Two armoured gunboats for the Danube built at Leghorn. The Nadiezda, despatch vessel (715 tons), launched Bordeaux, 1898; 18·85 knots; 2600 I.H.P.; Lagrafel-d'Allest boilers; armament, 2 3·9-in., 3 1·8-in. Q.F., and 2 torpedo tubes. Three 100-ton 26-knot torpedo-boats launched 1907; three smaller.

Colombia.—Cruiser Almirante Lezo (*ex* El Baschir), 1200 tons; 2500 H.P.; 18 knots; built 1892, bought from Morocco. Gunboats, Chercuito and Bogota. River gunboats, General Nerino and Esperanza, 400 tons. Three Yarrow motor gunboats, 1913.

Cuba.—Cruiser Cuba, 2055 tons, 3500 H.P., 18 knots, and gunboat Patria, 1200 tons, 1500 H.P., 16 knots.

Ecuador.—The torpedo cruiser Almirante Simpson, 812 tons, bought from Chili. One torpedo-boat and two transport vessels.

Egypt.—The Nile stern-wheel gunboats Sultan, Sheikh and Melik, 140 tons, Fateh and Naseh, 128 tons; also the Abu Klea, Hafir, Metemmeh, and Tamai.

Hayti.—Steel gunboat—Capois la Mort, 260 tons, 1 3·9-in., and 4 1-pr. Q.F. Iron corvette—Dessalines, 1200 tons, armed with 1 3·9-in. Q.F., 2 3·9-in. B.L., 2 l., 2 M. Two sloops—St. Michael and 1804. Gun-vessel, 22nd of December. The gunboat Liberté was blown up and destroyed, with a loss of 70 lives. It is stated that the Italian cruiser Umbria, 2245 tons, has been bought.

Mexico.—Two gun-vessels, Tampico and Vera Cruz, launched Elizabethport, New Jersey, 1902; displacement, 980 tons; armament, 4 4-in. Q.F., 6 6-pr.; bow torpedo tube; 2400 I.H.P.; speed, 16 knots; fitted to serve as transport for 200 troops. Gun vessels Bravo and Morero, 1200 tons; 2600 I.H.P.; Blechynden boilers; 17 knots; launched Leghorn, 1904. The Zaragoza, 1200 tons, 1300 H.P., 15 knots speed, and armed with 4 4·7-in. guns and 4 small quick-firing guns. Gun-vessel, Democrata, 450 tons; 11 knots; 2 6½-in. muzzle-loaders and 2 small guns. Torpedo transport General Guerrero, 1880 tons; 1200 I.H.P.; completed at Barrow 1908. Two small gunboats of 10 knots speed. Five torpedo-boats. Two cruisers, 2400 tons, to be built.

Peru.—Almirante Grau and Coronel Bolognesi, cruisers, 3200 tons; 370 ft. long, 40 ft. 6 in. beam, 14 ft. 3 in. draught; Barrow,

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1906; 2 6-in., 8 14-pdr., 8 1¼-pdr.; 2 submerged torpedo tubes; 1½-in. armoured deck, 3-in. conning tower; 14,000 I.H.P.; 24 knots. Eclaireur, cruiser, 1769 tons, launched 1877, partially reconstructed; bought from France. Armoured cruiser Dupuy de Lôme, purchased for £140,000, and renamed Elias Aguirre. Lima, 1700 tons, 1800 I.H.P., 16 knots; armament, 2 6-in. guns. Destroyer, Rodriguez, 500 tons, and submarines, Ferré and Palacios, built Le Creusot, 1912–13. Screw steamer, Santa Rosa, about 400 tons.

Roumania.—Elizabeta, protected cruiser (deck 3 in.), built in 1887 at Elswick; 230 ft. long, 32 ft. 10 in. beam; 1320 tons; 3000 I.H.P.; armament, 4 5·9-in. B.L.R., 4 Q.F., 2 M., 4 torpedo tubes. Composite gunboat Mircea, 360 tons; Grivitza, 110 tons. Two gunboats, 45 tons, and 3 first-class torpedo-boats. For the Danube, the gunboats Fulgurul, Oltul, Siretul, Bistritza, 90 to 100 tons, Alexandru cel Bun, 104 tons, 5 sloops, 2 small torpedo-boats. The shipbuilding programme includes 8 monitors of 600 tons (of which four are to be built, 1913), 12 torpedo-boats and 8 vedettes for the Danube, and 6 coast-defence vessels of 3500 tons, 4 destroyers of 300 tons, and 12 torpedo-boats for the Black Sea. Four monitors (3 4·7-in. guns) and 3 torpedo-boats completed.

Santo Domingo.—The Independencia, built in England 1894, 170 ft. long, 25 ft. broad, displacement 322 tons, and armed with seven Hotchkiss quick-firing guns. Restauracion, steel gun-vessel, 1000 tons, launched at Glasgow in 1896. The 14-knot cruiser Presidente has been reconstructed, and carries seven guns.

Sarawak.—Two gunboats, of 175 and 118 tons respectively, of low speed, each armed with two guns.

Siam.—Deck-protected cruiser, Maha Chakrkri, 290 ft. long, 39 ft. 4 in. beam, of 2500 tons displacement and 17 to 18 knots speed; armament, four 4·7-in. and ten 6-pdr. quick-firing guns. Makut-Rajakamar, 650 tons. The gunboats Bali, Muratha, and Sugrib, 600 tons, one 4·7-in. Q.F., five 2·2 in., four 1·4 in., 12 knots, launched 1898 and 1901. Several other gunboats. Three modern despatch vessels 100 to 250 tons. Three 380-ton, 27-knot destroyers, built at Kobe.

Uruguay.—Gunboats: General Artigas, 274 tons, 12½ knots speed, 2 4·7-in. (Krupp), 2 M.; and General Saurez, 300 tons. The cruiser Uruguay, built at the Vulcan Yard, Stettin; 1100 tons; 2 4·7-in., 4 12-pdr., 12 Maxims; 2 18-in. torpedo tubes; 5700 I.H.P.; 23 knots.

Venezuela.—Gunboats Bolivar, 571 tons, 18·6 knots, and Miranda, 200 tons, 12 knots; transports Restaurador, 568 tons, and Zamora, 350 tons. Maresa Sucre (ex Isla de Cuba), drill ship, bought from United States, 1912.

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BRITISH AND FOREIGN FLOTILLAS.

Great Britain.

Name or Number.	Built by.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Mean Speed on Trial, or expected.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
Great Britain. **Torpedo-Boat Destroyers.**			Feet	Feet.	Feet.		Tons.		Knots.				Tons.
†Bruizer	Thornycroft	1895	201·6	19	7·3	2	265	4,500	27·97	1-12 pr. 5-6 prs.	1	45	60
Conflict	White	1894	205·6	20	.	2	320	4,370	27·21	1-12 pr. 5-6 prs.	2	50	60
Fervent	Hanna	1895	200	19	7·8	2	275	3,800	[27]	1-12 pr. 5-6 prs.	1	50	70
Lightning	Palmer	1895	200	19·7	6·5	2	275	4,007	27·94	1-12 pr. 5-6 prs.	2	50	60
Opossum	Hawthorn	1895	200	19	5·2	2	295	4,052	28·24	1-12 pr. 5-6 prs.	1	50	60
Porcupine	Palmer	1895	200	19·7	6·5	2	275	3,866	27·91	1-12 pr. 5-6 prs.	2	50	60
Ranger	Hawthorn	1895	200	19	5·2	2	295	3,900	27·13	1-12 pr. 5-6 prs.	1	50	60
Sunfish	Hawthorn	1895	200	19	5·2	2	295	4,292	27·62	1-12 pr. 5-6 prs.	1	50	60
Surly	Thomson	1894	205·6	19·5	5·25	2	280	4,400	28·05	1-12 pr. 5-6 prs.	2	50	50
Zephyr	Hanna	1895	200	19	5·3	2	275	3,850	[27]	1-12 pr. 5-6 prs.	1	50	60
†Albatross	Thornycroft	1898	227·6	21·25	8·5	2	430	7,900	31·5	1-12 pr. 5-6 prs.	2	68	100
†Angler	,,	1897	210	19·6	7·1	2	310	5,800	30·37	1-12 pr. 5-6 prs.	2	60	80
Arab	Brown & Co.	1901	218	20·0	5·6	2	470	6,000	31	1-12 pr. 5-6 prs.	2	60	80
†Avon	Vickers	1896	210·6	21·6	5·6	2	355	6,000	30	1-12 pr. 5-6 prs.	2	60	80
Bat	Palmer	1896	215	20·75	6·8	2	360	6,185	30·1	1-12 pr. 5-6 prs.	2	60	91
†Bittern	Vickers	1897	210·6	21·6	5·6	2	355	6,000	30	1-12 pr. 5-6 prs.	2	60	80
Brazen	Brown & Co.	1896	218	20·0	5·6	2	345	6,000	30	1-12 pr. 5-6 prs.	2	60	80
†Bullfinch	Earle's Co.	1898	210	20·6	5·8	2	345	5,800	30	1-12 pr. 5-6 prs.	2	60	80
†Cheerful	Hawthorn	1897	210	21·0	8	2	355	6,100	30	1-12 pr. 5-6 prs.	2	62	82
†Coquette	Thornycroft	1897	210	19·5	7·2	2	335	5,800	30·21	1-12 pr. 5-6 prs.	2	60	80
Crane	Palmer	1896	215	20·7	6·8	2	360	6,336	30·3	1-12 pr. 5-6 prs.	2	60	80
†Cygnet	Thornycroft	1898	210	19·5	7·2	2	335	5,800	30·3	1-12 pr. 5-6 prs.	2	60	80
†Cynthia	,,	1898	210	19·5	7·2	2	355	5,800	30·2	1-12 pr. 5-6 prs.	2	60	80
†Desperate	,,	1896	210	19·6	7·2	2	310	5,800	30	1-12 pr. 5-6 prs.	2	60	80
†Dove	Earle's Co.	1898	210·0	20·6	5·8	2	345	5,800	30	1-12 pr. 5-6 prs.	2	60	80
Earnest	Laird	1896	210·6	21·7	5·3	2	355	6,000	30·13	1-12 pr. 5-6 prs.	2	58	80
Electra	Brown & Co.	1896	218	20·0	5·6	2	3[illegible]0	6,000	30	1-12 pr. 5-6 prs.	2	58	80
Express	Laird	1897	227·6	22·0	9	2	465	9,000	31	1-12 pr. 5-6 prs.	2	60	80
Fairy	Fairfield	1897	227·6	22·0	9	2	355	6,000	30	1-12 pr. 5-6 prs.	2	60	80
†Falcon	,,	1899	220	2[illegible]·3	9	2	375	6,000	30	1-12 pr. 5-6 prs.	2	60	80
†Fame	Thornycroft	1896	210·6	19·6	7·1	2	310	5,800	30·16	1-12 pr. 5-6 prs.	2	60	80
Fawn	Palmer	1897	215	20·7	6·8	2	360	6,581	30·5	1-12 pr. 5-6 prs.	2	60	91
Flirt	,,	1897	215	20·7	6·8	2	360	6,682	30	1-12 pr. 5-6 prs.	2	60	91
Flying Fish	,,	1897	215	20·7	6·8	2	360	6,416	30·4	1-12 pr. 5-6 prs.	2	58	91
†Foam	Thornycroft	1896	210	19·6	7·1	2	310	5,800	30·18	1-12 pr. 5-6 prs.	2	58	80
Gipsy	Fairfield	1897	227·6	22·0	9	2	355	6,000	30	1-12 pr. 5-6 prs.	2	60	80
Greyhound	Hawthorn	1900	2[illegible]0	21	8·6	2	385	6,000	30	1-12 pr. 5-6 prs.	2	60	90
Griffon	Laird	1896	210·0	20	5·3	2	355	6,000	30·11	1-12 pr. 5-6 prs.	2	58	80
Kestrel	Brown & Co.	1898	218	20·0	5·6	2	350	6,000	30	1-12 pr. 5-6 prs.	2	60	80
Kangaroo	Palmer	1900	215	20·75	6·8	2	370	6,500	30	1-12 pr. 5-6 prs.	2	60	91
Leopard	Vickers	1897	210	20·0	5·6	2	350	6,000	30	1-12 pr. 5-6 prs.	2	60	80
Leven	Fairfield	1898	218·0	20·0	5·6	2	370	6,000	30	1-12 pr. 5-6 prs.	2	58	80
Lively	Laird	1900	218	20·0	5·6	2	385	6,000	30	1-12 pr. 5-6 prs.	2	58	80
Locust	,,	1896	210	21·7	5·3	2	355	6,000	30·16	1-12 pr. 5-6 prs.	2	58	80
†Mallard	Thornycroft	1896	210·6	19·6	7·1	2	310	5,800	30·11	1-12 pr. 5-6 prs.	2	60	80
Mermaid	Hawthorn	1898	210	21·0	8	2	355	6,000	30	1-12 pr. 5-6 prs.	2	60	82
Myrmidon	Palmer	1900	215	20·75	6·8	2	370	6,500	30	1-12 pr. 5-6 prs.	2	62	91
Orwell	Laird	1898	218·0	20·0	5·6	2	360	6,000	30	1-12 pr. 5-6 prs.	2	58	80
Osprey	Fairfield	1897	227·6	22·0	9	2	355	6,000	30	1-12 pr. 5-6 prs.	2	60	80
†Ostrich	,,	1900	210	21·0	9	2	375	6,000	30	1-12 pr. 5-6 prs.	2	60	80
Otter	Vickers	1896	210	20·0	5·6	2	350	6,000	30	1-12 pr. 5-6 prs.	2	60	80
Panther	Laird	1897	210·6	21·7	5·3	2	355	6,000	30·14	1-12 pr. 5-6 prs.	2	58	80
Peterel	Palmer	1899	215	20·8	..	2	370	6,200	30	1-12 pr. 5-6 prs.	2	62	85
Quail	Laird	1895	213·6	21·6	5·3	2	355	6,000	30·38	1-12 pr. 5-6 prs.	2	58	90
Racehorse	Hawthorn	1900	210	21	8·6	2	385	6,000	30	1-12 pr. 5-6 prs.	2	60	90
Recruit	Brown & Co.	1896	218·0	20·0	5·6	2	350	6,000	30	1-12 pr. 5-6 prs.	2	58	90
Roebuck	Hawthorn	1901	210	21	8·6	2	385	6,000	30	1-12 pr. 5-6 prs.	2	60	90
Seal	Laird	1897	218·0	20·0	5·6	2	355	6,000	30·15	1-12 pr. 5-6 prs.	2	58	80
Spiteful	Palmer	1899	215	20·75	6·8	2	365	6,500	30·1	1-12 pr. 5-6 prs.	2	62	81
Sprightly	Laird	1900	218	20·0	5·6	2	385	6,000	30	1-12 pr. 5-6 prs.	2	58	80
†Stag	Thornycroft	1900	210	19·75	7·2	2	320	5,800	30·34	1-12 pr. 5-6 prs.	2	60	80

All Jarrow-built destroyers have Reed's boilers. † Thornycroft W.T. boilers.

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Great Britain—*continued.*

Name or Number.	Built by.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Mean Speed on Trial, or expected.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
TORPEDO-BOAT DESTROYERS.			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Star	Palmer	1896	215	20·75	6·88	2	360	6,266	30·7	1-12 pr. 5-6 prs.	2	58	91
Success	Doxford	1901	210·0	21·0	9·2½	2	3[illegible]0	6,000	30	1-12 pr. 5-6 prs.	2	62	43
†Sylvia	,, ...	1897	210	19·9	7·6	2	350	5,400	30	1-12 pr. 5-6 prs.	2	58	80
Syren	Palmer	1900	215	20·75	6·8	2	390	6,500	30	1-12 pr. 5-6 prs.	2	..	91
Taku	Schichau	1898	193·6	20	5	2	305	6,500	32	6-3 pr. Q.	3	..	67
Thorn	Brown & Co. ..	1900	210	21	5·5	2	380	6,000	30	1-12 pr. 5-6 prs.	2	58	80
Thrasher	Laird	1895	210·6	21·7	5·3	2	355	6,000	30·13	1-12 pr. 5-6 prs.	2	58	80
Vigilant	Brown & Co. ..	1900	210	21	5·5	2	380	6,000	30	1-12 pr. 5-6 prs.	2	58	80
†Violet	Doxford	1897	210	20·75	6·88	2	350	5,400	30	1-12 pr. 5-6 prs.	2	58	80
Virago	Laird	1895	210·6	21·7	5·3	2	355	6,000	30·13	1-12 pr. 5-6 prs.	2	58	80
*a*Vixen	Vickers	1900	210·0	20·0	5·8	2	400	6,000	30	1-12 pr. 5-6 prs.	2	62	88
Vulture	Brown & Co. ..	1898	218	20	5·6	2	345	6,000	30	1-12 pr. 5-6 prs.	2	58	80
Whiting	Palmer	1896	215	20·75	6·88	2	360	6,239	30·2	1-12 pr. 5 6 prs.	2	58	91
Wolf	Laird	1897	218	20	5·6	2	355	6,000	30	1-12 pr. 5-6 prs.	2	58	80
Derwent	Hawthorn	1904	220	23	10	2	534	7,000	25·68		2	70	130
‡Eden	,, ...	1903	220	23	8½	6	527	7,000	26·22		2	70	130
Exe	Palmer	,,	225	23½	10	2	540	7,000	25·64		2	70	127
Ribble	Yarrow	1904	225	23½	10	2	550	7,500	26		2	70	120
Itchen	Laird	1903	225	23½	10	2	550	7,000	25·64		2	70	130
Usk	Yarrow	,,	225	23½	10	2	550	7,500	26		2	70	120
Teviot	Yarrow	,,	225	23½	10	2	550	7,500	26		2	70	120
Ettrick	Palmer	,,	225	23½	10	2	540	7,000	25·56	4-12 prs.	2	70	127
Foyle	Laird	,,	225	23½	10	2	550	7,000	25·65		2	70	120
Erne	Palmer	,,	225	23½	10	2	540	7,000	25·6		2	70	127
Arun	Laird	,,	225	23½	10	2	550	7,000	25·72		2	70	130
Cherwell	Palmer	,,	225	23½	10	2	540	7,000	25·6		2	70	127
Dee	Palmer	,,	225	23½	10	2	540	7,000	25·5		2	70	127
Jed	Thornycroft ..	1904	222	23½	9·6	2	640	7,500	25·78		2	70	126
Kennet	,, ..	1903	222	23½	9·6	2	640	7,500	25·99		2	70	126
‡Velox	Parsons	1902	210	23	8½	8	440	8,000	27	1-12 pr. 5-6 prs.	2	63	130
Waveney	Hawthorn	1903	220	23½	10	2	534	7,000	25·62	4-12 prs.	2	70	130
Welland	Yarrow	1904	225	23½	10	2	550	7,500	26		2	70	120
Chelmer	Thornycroft ..	1904							25·7				
Boyne	Hawthorn	1904							25·72				
Colne	Thornycroft ..	1905							25·57				
Doon	Hawthorn	1904							25·8				
Garry	Yarrow	1905							26·5				
Kale	Hawthorn	1904							25·74				
Rother	Palmer	1904							25·51				
Liffey	Laird	1904	222	23½	9·6	2	600	7,500	25·51	4-12 prs.	2	72	95 126
Moy	,, ...	1904							25·6				
Ness	White	1905							25·62				
Nith	,, ...	1905							25·69				
Ouse	Laird	1905							25·56				
Swale	Palmer	1905							25·59				
Ure	Palmer	1904							25·65				
Wear	Palmer	1905							25·62				

† Thornycroft W.T. boilers. ‡ Hulls and Yarrow boilers of these vessels by Hawthorn Leslie & Co.
a Has four Express W.T. boilers.

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Great Britain—*continued.*

Name or Number.	Built by.	Launched.	Dimensions. Length.	Dimensions. Beam.	Dimensions. Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal or Oil.
OCEAN-GOING DESTROYERS.			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
‡*Afridi	Armstrong	1907	250	25	8·5	3	872	14,250	32·75				92½e
‡*Cossack	Cammell Laird	1907	270	26	9·3	3	890	14,000	33·15				78
‡*Ghurka	Hawthorn	1907	255	25·7	9·3	3	880	14,250	34	5–12-prs.	2	60	98
¶*Mohawk	White	1907	270	25	8·10	3	865	14,500	34·51				74
†*Tartar	Thornycroft	1907	270	26	9·1	3	870	14,500	35·67				76
¶*Saracen	White	1908	272	26	9·5	3	980	15,500	33·8	2·4-in. B.L.	2	67	84e
†*Amazon	Thornycroft	1908	280	26½	9·2	3	970		33·73				86e
¶*Crusader	White	1909	280	26	9·8	3	1045	15,500	35				99e
‡*Maori	Denny	1909	280	27	8·8	3	1035	15,500	33				103e
†*Nubian	Thornycroft	1909	280	26½	9·1	3	985	15,500	31·88	2·4-in. B.L.	2	71	97½e
‡*Viking	Palmer	1909	280	27·3	8·7	3	1090	15,500	..				102½e
‡*Zulu	Hawthorn	1909	280	27	8·9	3	1027	15,500	34				94e
§Albacore	Palmer *b*	1908	215	21	7	..	440	6,000	26·75	3–12 prs.	2	43½	..
§Bonetta													
¶§Basilisk	White	1910	275	28			984		27·98				
‡§Beagle	John Brown	1909	269	26·7			940		27·12				
‡§Bulldog	"	1909	269	26·7			940		27·4				
‡§Foxhound	"	1909	269	26·7			940		27·7				
‡§Grasshopper	Fairfield	1909	271	27¾			890		27·04				
¶§Harpy	White	1909	275	28			984		27·75				
‡§Mosquito	Fairfield	1910	271	27¾	8·6	3	890	12,500	27·12	1·4 in., 3-12 prs.	2	96	120e
‡§Nautilus	Thames Ironworks	1910	267½	28			964		28·1				
‡§Pincher	Denny	1910	271¾	28½			940		27·17				
‡§Racoon	Cammell Laird	1910	266	28			920		27·07				
‡§Rattlesnake	Lond. & Glasgow Co.	1910	270½	27½			938		27·03				
‡§Renard	Cammell Laird	1909	266	28			920		27·14				
‡§Savage	Thornycroft	1910	264	28	9·3	3	885		27·16				
‡§Scorpion	Fairfield	1910	271	27·9	..	3	890	12,500	27·1	1·4-in., 3-12 prs.	2	96	..
‡§Scourge	Hawthorn	1910	266¾	28	8·6	3	925		27·06				
‡§Wolverine	Cammell Laird	1910	266	28	..	3	920		27·1				
‡§Stour	Cammell Laird *c*	1909	220	23·9	7·11	..	566	7,000	25·58	4-12-prs.	2	..	66½
‡§Test									25·62				
‡*Acorn	John Brown	1910							27·22				
‡*Alarm		1910							27·2				
‡*Brisk		1910							27·6				
‡*Cameleon	Fairfield	1910							28·03				
‡*Comet		1910							27·9				
‡*Goldfinch		1910							28				
‡*Fury	Inglis	1911							27·3				
‡*Hope	Swan, Hunter	1910							27·1				
‡*Larne	Thornycroft	1910							28·72				
‡*Lyra		1910	240	25·6	7·10	3	780	13,500	28·88	2·4-in. B.L., 2-12 prs.	2	72	85e
‡*Martin		1910							28·9				
‡*Minstrel		1911							28·9				
‡*Nemesis	Hawthorn	1910							27				
‡*Nereide		1910							27·8				
‡*Nymphe		1911							27·5				
¶*Redpole	White	1910							29·8				
¶*Rifleman		1910							29·3				
¶*Ruby		1910							30·23				
‡*Sheldrake	Denny	1911							28·3				
‡*Staunch		1910							28·6				
‡*Acheron	Thornycroft	1911	251¾	26·4	8·7½	2	780	15,500	29·4	2 4-in. Q.F., 2 12-prs.	2	72	89
‡*Ariel		1911							29·4				
‡*Archer	Yarrow	1911	240	25·7	8·5	2	780	16,000	30·9	2 4-in. Q.F., 2 12-prs.	2	72	87
‡*Attack		1911							30·6				
‡*Badger	Parsons	1911	240	25·10	8·4	2	780	16,500	*d*	2 4-in. Q.F., 2 12-prs.	2	72	86
‡*Beaver		1911							*d*				
‡*Defender	Denny	1911							28·3				
‡*Druid		1911							*d*				
¶*Ferret	White	1911							30·2				
¶*Forester		1911							29·8				
‡*Goshawk	Beardmore	1911							*d*				
‡*Hind	John Brown	1911							28·1				
‡*Hornet		1911	240	25½	7·10	3	750	13,500	*d*	2 4-in. Q.F., 2 12-prs.	2	72	89
‡*Hydra		1912							*d*				
‡*Jackal	Hawthorn	1911							26·9				
‡*Tigress		1911							28·6				
‡*Lapwing	Cammell Laird	1911							*d*				
‡*Lizard		1911							*d*				
‡*Phœnix	Vickers	1911							*d*				
‡*Sandfly	Swan, Hunter	1911							27·7				
‡*Firedrake	Yarrow	1912	255	25·7	8·6	2	860	20,000	33·2	2 4-in. Q.F., 2 12-prs.	2	72	86
‡*Lurcher									35·3				
‡*Oak									32·4 *f*				

* Fitted with turbines and for using oil fuel. † Have Thornycroft W.T. boilers. ‡ Fitted with modified Yarrow W.T. boilers.
§ Fitted with turbines and for using coal. ¶ Fitted with White-Forster boilers.
b Purchased after completion, March, 1909, to replace Tiger and Gala.
c Purchased after completion, December, 1909, to replace Blackwater and Lee. *d* Designed speed, 27 knots; trial speed not published.
e Estimated. *f* Tested with additional 100 tons load.

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Great Britain—*continued.*

Name or Number.	Built by.	Launched.	Dimensions. Length.	Dimensions. Beam.	Dimensions. Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal or Oil.
OCEAN-GOING DESTROYERS—*contd.*			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
‡*Acasta		1912							29				
‡*Achates	John Brown	1912	260	27	9·4	3	935	24,500	32·3	3 4-in.	2	100	129
‡*Ambuscade		1913							30·4				
‡*Ardent	Denny	1913	260	28	9·2	2	935	24,000	29·6	3 4-in.	2	100	142
‡*Christopher		1912							29				
‡*Cockatrice	Hawthorn	1912	260	27	9·4	3	935	24,500	0·9	3 4-in.	2	100	129
‡*Contest		1913							29·7				
‡*Fortune	Fairfield	1913	260	27	9·2¼	2	952	25,000	30·7	3 4-in.	2	100	129
‡*Garland	Cammell Laird (*b*)	1913	260	27	9·2¼	2	952	24,500	31	3 4-in.	2	100	..
‡*Hardy (*a*)	Thornycroft	1912	257	26¼	8·0	..	935	24,500	32	3 4-in.	2	100	..
‡*Lynx													
‡*Midge	London and Glasgow Co.	1913	260	27	9·4	3	935	24,500	32·9	3 4-in.	2	100	129
‡*Owl													
‡*Paragon													
‡*Porpoise	Thornycroft	1913	257	26¼	9·2¼	2	928	22,500	30·8	3 4-in.	2	100	128
‡*Unity													
‡*Victor													
‡*Shark									31·4				
‡*Sparrowhawk ..	Swan, Hunter ..	1912	260	27	9·4	3	935	24,500	30·7	3 4 in.	2	100	129
‡*Spitfire									30·3				
‡*Laforey		1913											
‡*Lawford	Fairfield	1913											
‡*Louis		1913											
‡*Lydiard		1914											
‡*Leonidas	Palmer (*b*)	1913											
‡*Lucifer		1913											
‡*Llewellyn	Beardmore	1913											
‡*Lennox		1914											
‡*Laertes	Swan, Hunter (*c*) ..	1913											
‡*Lysander		1913	260	27·8	9·5	2	965	24,500	29	3 4-in.	..	100	135
‡*Laurel	White	1913											
‡*Liberty		1913											
‡*Loyal	Denny	1913											
‡*Legion		1914											
‡*Lance	Thornycroft	1914											
‡*Lookout		1914											
‡*Lark		1913											
‡*Linnet	Yarrow	1913											
‡*Laverock		1913											
‡*Landrail		1914											
‡*Milne													
‡*Moorsom	John Brown ..	..	..	..	..	..	..	..	..	..	..	..	..
‡*Morris													
‡*Matchless	Swan, Hunter (*c*) ..	..	..	..	..	..	..	..	..	..	..	..	..
‡*Murray													
‡*Myngs	Palmer	..	..	..	..	..	..	..	..	..	..	..	..
‡*Miranda													
‡*Minos	Yarrow	..	..	..	..	..	..	..	..	..	..	..	..
‡*Manly													
‡*Mentor													
‡*Mansfield	Hawthorn	..	..	..	..	..	..	..	..	..	..	..	..
‡*Meteor													
‡*Mastiff	Thornycroft ..	..	..	..	..	..	..	..	..	..	..	..	..
‡*Lightfoot	White	..	..	..	..	..	..	..	..	..	..	..	..
‡*Marksman	Hawthorn	..	..	..	..	..	..	..	..	..	..	..	..
TORPEDO BOATS.													
FIRST CLASS—													
025–027 (3 boats) ..	Thornycroft	1886	127·5	12·5	6·2	1	60	600	21	2-3 prs.	3	..	10
033	Yarrow	1886	125	13	5·5	1	66	670	19·5	2-3 prs.	5	15	20
034	White	1886	125	14·6	4	1	66	950	18–19	..	5	15	..
041, 042 (2 boats), 049–055 (7 boats), 057, 058 (2 boats)	Thornycroft	1886	127·5	12·5	6·2	1	60	700	21	2-3 prs.	4	15	..
065–068 (4 boats) .. 071–074 (4 boats) .. 076–078 (3 boats) ..	Yarrow	1886	125	13	5·5	1	75	700	19–20	2-3 prs.	5	15	20
079	,, ...	1886	125	13	5·5	..	75	1,000	22·4	2-3 prs.	..	15	20
80	,, ...	1887	135	14	6	1	105	1,540	23	4-3 prs.	5	21	30
81 (*ex*-Swift)	White	1885	150	17·5	..	1	125	..	..	6-3 prs.	3	25	35
82, 83 (2 boats) ..	Yarrow	1889	130	13·5	5·5	1	85	1,100	23	3-3 prs.	3	19	20
85–87 (3 boats) ..	,, ...	1889	130	13·5	5·5	1	85	1,100	23	3-3 prs.	3	19	20
88, 89 (2 boats) ..	,, ...	1894	142	14·75	4·5	1	112	1,600	..	3-3 prs.	3	18	20
90	,, ...	1895	140	14·25	3·7	1	100	1,430	..	3-3 prs.	3	18	18
91, 92 (2 boats) ..	Thornycroft	1894	140	15·5	7·5	1	130	2,400	23-24	3-3 prs.	3	18	25
93	,, ...	1893	140	15·5	5·4	2	130	2,200	23·5	3-3 prs.	3	18	25
95, 96 (2 boats) ..	White	1894	140	15·5	..	1	130	2,000	23·2	3-3 prs.	3	18	25
97	Laird	1893	140	15·5	..	1	130	2,690	23·35	3-3 prs.	3	18	25
98, 99 (2 boats) ..	Thornycroft	1901	160	17	8·4	1	178	2,850	25	3-3 prs.	3	32	20
101	M'Arthur	1888	130·5	14	..	1	92	1,060	21	2-3 prs.	3	18	35
102, 103 (2 boats) ..	Thornycroft	1888	134·6	14·8	7·1	1	96	1,050	23·2	2-3 prs.	3	18	..
104–105 (2 boats) ..	White	1889	130	14·5	..	1	95	1,250	20	2-3 prs.	3	19	..
107, 108 (2 boats) ..	Thornycroft	1901	160	17	8·4	1	178	2,850	25	3-3 prs.	3	32	20
109–113 (5 boats) ..	,, ...	1902	166	17·25	8·4	1	200	2,900	25	3-3 prs.	3	32	42
114–117 (4 boats) ..	White	1903	165	17·6	8·8	1	205	2,900	25	3-3 prs.	3	32	28

* Fitted with turbines and for using oil fuel. ‡ Fitted with modified Yarrow W.T. boilers.
a Fitted with Diesel engines for cruising purposes. *b* Turbines by Parsons. *c* Turbines by Wallsend Co.

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Great Britain—*continued.*

Name or Number.	Built by.	Launched.	Dimensions. Length.	Dimensions. Beam.	Dimensions. Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal or Oil.
TORPEDO BOATS—*cont.*													
FIRST CLASS—*cont.*			Feet.	Feet.	Feet.		Tons.		Knots.				
*Pro. 1905-6 — 5 boats (1-5) ..	¶ White	1906	175	17½	5·8	3	235	3,750	26	2-12 prs.	3	35	20*f*
5 boats (6-10)†	¶ Thornycroft ..	1906-7	166½	17½	6·3	3	255	3,750	27·3	2-12 prs.	3	35	
2 boats (11-12)‡	¶ Yarrow	1907	172	18	5·3	3	225	3,750	26	2-12 prs.	3	35	
*Pro. 1906-7 — 4 boats (13-16)‡ ..	White	1907	182	18	5·10	3	256	4,000	26	2-12 prs.	3	..	23·5
2 boats (17-18)‡ ..	Penny	1907	180	18	5·6	3	251	4,000	26	2-12 prs.	3	..	
2 boats (19-20)† ..	Thornycroft	1907-8	178·6	18·3	6.5	3	280	4,000	26	2-12 prs.	3	..	
2 boats (21-22)‡ ..	Hawthorn	1907-8	185	18·6	6·6	3	308	4,000	26	2-12 prs.	3	..	
No. 23 ‡	Yarrow	1907	177·3	18	5 4	3	253	4,000	26	2-12 prs.	3	..	
No. 24 ‡	Palmer	1908	177	17 9	6·5	3	292	4,000	26	2-12 prs.	3	..	
*Pro. 1907-8 — 4 boats (25-28)	White	1908	182	18	6 6	3	283	4,000	26	2-12 prs.	3	..	25
2 boats (29-30)‡	Penny	1908	180	18	5·3	3	259	4,000	26	2-12 prs.	3	..	25½
2 boats (31-32)†	Thornycroft	1908	178·6	18 75	6 2	3	287	4,000	26·5	2-12 prs.	3	33	24½
2 boats (33-34)‡	Hawthorn	1909	185	18 6	6·5	3	316	4,000	26	2-16 prs.	3	..	23½
3 boats (35-36)‡	Palmer	1909	177	17·9	6 6	3	298	4,000	26	2-12 prs.	3	33	24

* Fitted with turbines and for using oil fuel. † Have Thornycroft W.T. Boilers. ‡ Fitted with modified Yarrow W.T. boilers.
¶ These boats were originally named, as shown in the *Naval Annual* for 1906-1907. *f* 1000 knots.

Number.	Built by.	Launched.	Dimensions. Length.	Dimensions. Beam.	Number of Screws.	Submerged Displacement.	Indicated Horse-Power.	Speed. Surface.	Speed. Submerged.	Torpedo Tubes.	Complement.	Fuel.
SUBMARINES.			Feet.	Feet.		Tons.		Knots.	Knots.			Tons.
9 boats (Nos. A 5-A 13, 1903-4) ..	Vickers	1904	150	..	..	204	600	16	9	2	..	..
10 boats (B Class) ..	,, ...	1905	135	13½	..	313	600	13	9	2	..	15
10 boats (1905-6) C class	,, ...	1906-7	135	13½	..	313	600	14	10	2	..	15
5 boats (1906-7) C12-16	,, ...	1907-8	135	13½	..	313	600	13	..	2	..	15
1 boat (1906-7) D 1 ..	,, ...	1908	..	..	2	595	1,200	16	10	3	..	..
2 boats (1906-7) C 17 & C 18	Chatham	1908	135	13½	..	313	600	13	..	2	..	15
2 boats (1907-8) C 19-C 20	Chatham	1909	135	13½	..	321	600	13	10	2	..	15
10 (1907-8)—												
C 21-C 24 .. .. C 25-C 30	Vickers	1908 1909	135	13½	..	321	600	13	..	2	..	15
2 (1908-9) C 33-C 34 .	Chatham	1910	135	13½	..	321	600	13	..	2	..	15
7 (1908-9)—												
C 31-C 32	Vickers	1909	135	13½	..	321	600	13	..	2	..	15
C 35 C 36	,, ...	1909										
C 37-C 38	,, ...	1910										
D 2	,, ...	1910	..	..	..	..	..	..	..	3	..	..
2 (1909-10) D 7-D 8 ..	Chatham	1911	..	..	..	604	1200	..	..	3	..	..
4 (1909-10) D 3-D 6 ..	Vickers	1911	..	..	..	..	..	..	..	3	..	..
2 (1910-11) E 1-E 2 ..	Chatham	1912	176	22½	..	800	1600	15	..	3	28	..
4 (1910-11) E 3 E 6 ..	Vickers	1912	176	22½	..	800	1600	15	..	3	28	..
2 (1911-12) E 7-E 8 ..	Chatham	1912	..	..	..	..	..	..	..	3	28	..
3 (1911-12) E 9-E 11 .	Vickers	1913 14	..	..	..	..	..	..	..	3	28	..
1 (1911-12) S. 1 ..	Scotts'	1914	..	..	..	..	..	..	..	..	..	..
2 (1912-13) E 12-E 13	Chatham	Bldg.	..	..	..	..	..	..	..	..	..	..
3 (1912-13) E 14-E 16	Vickers											
1 (1912-13) V. 1 ..	Vickers											
2 (1912-13) W 1-W 2	Armstrong											
1 (1912-13) Nautilus	Vickers											
2 (1913-14) E 17-E 18	Chatham											
1 (1913-14) F 1 ..	,, ...											
2 (1913-14) S 2 S 3 ..	Scotts'											
3 (1913-14) V 2 V 4	Vickers											
2 (1913-14) W 3-W 4	Armstrong											
1 (1913-14) Swordfish	Scotts'											

FLOTILLAS OF THE DOMINIONS.

Australia.

Name or Number.	Built by.	Launched.	Dimensions. Length.	Dimensions. Beam.	Dimensions. Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Mean Speed on Trial, or expected.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
TORPEDO-BOAT DESTROYERS.			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Yarra	Denny	1910	245¾	24¼	7·8	3	700	9,500	27	1 4-in., 3 12-pdr.	3	66	130
Parramatta	Fairfield	1910	245¾	24¼	7·8	3	700	9,500	28·48				
Warrego	Fairfield*	1911	245¾	24¼	7·8	3	700	9,500	28				
Swan	Commonwealth Dockyard .. Sydney	Bldg.	Details not published.			..	..	..	..	..	..	..	..
Derwent													
Torrens													
SUBMARINES													
A E 1-A E 2	Vickers	1914	176	22½	..	..	800	1,600	15	..	..	29	

* Transported in sections and reconstructed in Australia.

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Argentine Republic.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Fuel Capacity.
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Corrientes	Yarrow ..	1896	190	19 6	7·4	2	280	4,000	27·4 *t.*	1 14-pr.	3	54	80
Missiones..	Yarrow ..	1896	190	19·6	7·4	2	280	4,000	26·0 *t.*	3 6-pr,	3	54	80
Entre Rios	Yarrow ..	1896	190	19·6	7·4	2	280	4,000	26·7 *t.*	Q.F., 2 M.	3	54	80
Mendoza, Rioja, Salta, San Juan ..	Nantes ..	1911	283·2	28·3	9·9	..	950	18,000	32	4 4-in.	4	110	250*
Catamarca, Jujuy ..	Germania ..	1911	286·7	27·1	8·6	2	940	18,000	32	4 4-in.	4	110	250*
Cordoba, La Plata ..	Schichau ..	1911	279	29·6	7·3	..	890	19,000	34 7	4 4-in.	4	110	290*
Santiago, San Luis, Santa Fé, Tucuman	Germania, Kiel	Bldg.	312 9	30·3	8·9	2	1230 / 1127	30,000	32	3 4-in.	8	..	345
FIRST CLASS—													
2 boats	Thornycroft	1890–1	150	14·5	5·2	2	110	1,500	24·52	3 3-prs.	3	27	22
6 boats	Yarrow ..	1890	130	13·5	6	1	85	1,200	23–24	2 3-pr. Q.F.	2	15	15

The two 150-ft. boats are named Comodoro Py and Murature.
The six 130-ft. boats are named Bathurst, Buchardo, Jorge, King, Pinedo, and Thorne.
* Also oil fuel 50-110 tons French boats, Rateau turbines; German, German Admiralty type.

Austria-Hungary.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Fuel Capacity.
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Tatra, Balaton, Csepel, Lika, Orjenu, Triglav ..	Fiume.. ..	1912 / 1913	265·9	25·6	8·0	2	787	17,000	33	2 4-in. / 4 12-pr.	2	..	..
Huszar	Yarrow ..	1905											
Streiter		1906											
Ulan		1906											
Wildfang	Trieste ..	1906											
Uskoke		1907											
Scharfschütze		1907	219 8	20·3	..	2	394	6,000	28·5	1 12-pr. / 7 3-pr.	2	64	..
Dinara													
Csikos													
Pandur	Fiume ..	1908 / 1909											
Reka													
Turul													
Velebit													
FIRST CLASS—													
Kaiman	Yarrow ..	1905											
Alligator													
Anaconda													
Drache													
Delphin													
Greif..													
Hai													
Krokodil	Trieste ..	1906-7											
Moewe													
Narwal													
Pinguin													
Schwalbe													
Seehund			179·9	18·0	8·6	1	197	3,000	26	4 3-pr.	..	25	..
Wal													
Triton													
Alk													
Echse													
Hydra													
Kormoran	Fiume ..	1910											
Krake													
Molk..													
Phönix													
Polyp													
Skorpion													
Boa													
Cobra	Yarrow ..	1898-9	152·6	15·3	7·6	1	133	2,000	24·3	2 3-pr.	3	24	30
Kigyo													
Python													
Viper	Yarrow ..	1896	147·6	14·9	7·6	1	130	2,000	26·5	2 3-pr.	2	26	30
Natter	Yarrow ..	1896	150	17·5	8·8	2	152	2,300	26·5	2 3-pr.	3	..	30
74 T–81 T (8) ..	Trieste ..	1913											
82 F–97 F (6) ..	Fiume.. ..	and	188	19·0	5·0	2	246	5,000	28 5	2 3-pr.	2	..	..
98 M–100 M (3) ..	Monfalcone .	Bldg.											
SUBMERSIBLES—													
U 1 and 2	Pola	1908-9	100	9·8	..	..	216 / 240	720 / 200	12·2-7·3	..	3	..	..
U 3 and 4	Kiel, Germania	1908	141·8	12 6	..	2	235 / 295	600 / 320	12-9	..	2	17	..
U 5 and 6	Fiume.. ..	1909											
U 7–14	Fiume.. .. / Kiel, Germania	Bldg.	105	21·0	..	..	235 / 500	500	11·4-10	..	5	..	..

The destroyers have Yarrow boilers. About twenty torpedo-boats (83 tons), built 1890–93, are of doubtful value.

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Brazil.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Fuel Capacity.
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Para		1908						7,014	27·25				
Amazonas		1908						6,898	27·17				
Piahuy		1908						6,563	27·21				
Matto Grosso		1908						7,403	27·16				
Parahyba		1909						6,700	27·29				
Rio Grande do N ..	Yarrow ..	1909	240	23·6	10	2	550	7,778	27·27	2 4-in., 4 3 prs.	2	..	140
Alagoas		1909						7,403	27·25				
Santa Catharina ..		1909						6,982	27·30				
Parana		1910						8,877	28·74				
Sergipe		1909						8,554	27·60				
FIRST CLASS—													
Pedro Ivo .. .. .. / Silvado	Elbing ..	1892–3	152	17·1	7·9	2	130	2,200	28	2–1 prs.	3	24	30
Goyaz	Yarrow ..	1907	152·5	15·3	..	3	..	..	26·5	2–3 prs.	2	..	..
Gonzales	Thornycroft	1908	152·5	15 3	..	3	..	..	26·5	2–3 prs.	2	..	..

Five additional destroyers and three large submarines are proposed.
Three submersibles have been launched at Muggiano (F.I.A.T.), Medusa type improved (250–370 tons, 14-8·5 knots). A Special Laurenti submarine salvage and testing vessel is being built, 3800 tons, 328 ft. long, 50 ft. beam.

Chile.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Fuel Capacity.
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Almirante Lynch, Condell, Simpson, Goñi, Williams Robolledo, and Riveros (6)	White	1912 and Bldg.	320	32·6	11·1	3	1850	27,000	31·7	6-4-in. 2 M.	3	..	507
Capitan Orella ..	Laird	1896	210	21·6	5·4	2	300	6,000	30·17	1-12 pr. Q F. 5-6 pr.	2	65	90
Capitan Munoz Gamero	Laird	1896	210	21·6	5·4	2	300	6,000	30·42	1-12 pr. Q.F. 5-6 pr.	2	65	90
Teniente Serrano ..	Laird	1896	210	21·6	5.4	2	300	6,000	30·35	1–12 pr. Q.F. 5 6 pr.	2	65	90
Guardia-Marina Riquelme	Laird	1896	210	21·6	5·4	2	300	6,000	30·09	1-12 pr. Q.F. 5-6 pr.	2	65	90
Capitan Merino Tarpa .. .. .. / Capitan O'Brien ..	Laird	1901	210	21·6	5·4	2	350	6,000	30	Do.	2	65	90
FIRST CLASS—													
Injeniero Hyatt, Cirujano Videla, Injeniero Mutilla, Guardia-Marina Contreras, Capitan Thompson, and Teniente Rodriguez (Viper type) ..	Yarrow ..	1896 / 1898	152·6	15·3	7·9	1	140	2,200	27·5 27·2	3-3 pr. Q.F.	3	28	40

The Thompson and Rodriguez were sent out in sections, and put together at Talcahuano and Valparaiso. Submarines Antofagasta and Iquique built, Electric Boat Co., N.Y. (400 tons submerged, 8 tubes).

China.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Fuel Capacity.
FIRST CLASS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Cheng-Feng, Fu-Po, Fei-Yun	Elbing ..	1912	..	..	..	..	400	6000	36·8	2 12-pr., 4 3-pr.	2	..	..
Luang Tuan	Trieste ..	1912	..	..	..	..	400	6000	32	2 12-pr., 2 3 pr.	2	..	..
2 boats	Stettin ..	1897	123·5	21·7	..	..	120	..	20	2 1-pr.	3	20	15
Hupeng, Huchung, Hujing, Hungo ..	Kobe	1906-7	..	..	..	..	97	950	23	2 3-pr.	3	..	..
SECOND CLASS—													
1 boat	Foochow ..	1903	88·6	6·7	3·3	1	30	550	20·5				

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Denmark.

Name or Number.	Where Built.	Launched.	Dimensions.			Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Fuel Capacity.
			Length.	Beam.	Draught.								
First Class—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Ormen	Copenhagen	1907	125	14·3	..	..	98	2,000	26	2 1-pr.	3	..	21
Hajen	Copenhagen	1896	154·3	15·4	7·9	2	142	2,317	22·9	1 4·7-in. 1 1-pr.	3	..	..
Havörnen	Copenhagen	1897											
Söbjörnen	Copenhagen	1898											
Delfinen	Thornycroft	1883	111·5	12·6	6	1	59	620	20	1 mach.	2	14	9
Havhesten	Thornycroft	1888	137·9	14	7	1	94	1,200	22·8	2 1-pr. revs.	4	20	15
Hvalrossen	Thornycroft	1884	114	12·6	6·5	1	64	660	18·7	1 mach.	2	14	10
Makrelen	Copenhagen	1893	140	14·2	7	2	112	1,200	..	..	..	..	16
Narhvalen	Thornycroft	1888	137·9	14	7	1	94	1,200	22·3	2 1-pr. revs.	4	20	15
Nord Kaperen.. ..	Copenhagen	1893	140	14·2	7	2	112	1,200	..	2 1-pr. revs	4	..	16
Sölöven	Thornycroft	1887	131	14·8	6·8	1	89	1,200	23·3	2 mach.	4	20	14
Söulven	Havre.. ..	1880	94·8	10·9	3·9	1	37	450	18·1	..	2	12	5
Springeren	Copenhagen	1891	119	13	4·9	1	81	800	18·3	2 1-pr. revs.	2	20	14
Stören	Thornycroft	1887	131	14·8	6·8	1	89	1,200	23	2 mach.	4	20	14
Sværdfisken	Thornycroft	1881	110	12	6	1	49	600	20·7	1 mach.	2	14	9

Destroyers (230 tons, 27 knots), built, as follows:—Fyvesfisken (Schichau); Sorridderen (Yarrow), 27·2 knots; Soulven, Spaekhuggeren (Copenhagen dockyard); Tumleren, Vindhunden (Burmeister and Wain). Three others in hand.
Electric submersible Dikkeren, delivered by F.I.A.T. Co., Muggiano, 1909.—Length, 114 ft. 3 in.; beam, 11 ft.; 103-130 tons, 12-7½ knots. Submersibles Havmanden and Havfruen, of the Holland type, built by the Whitehead company, one at Fiume, the other at Copenhagen dockyard.

France.

Name or Number.	Where Built.	Launched.	Dimensions.			Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Fuel Capacity.
			Length.	Beam.	Draught.								
Destroyers—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Arbalète	Normand ..	1903	183·9	20·11	10·3	2	300	6,000	28	1-9pr. 6-3prs.	2	62	75
Arc	Châlon ..	1903	183·9	20·11	10·3	2	300	6,000	28	1-9pr. 6-3prs.	2	62	75
Arquebuse..	Normand ..	1902	183·9	20·11	10·3	2	300	6,000	28	1-9pr. 6-3prs.	2	62	75
Baliste	Rouen ..	1903	183·9	20·11	10·3	2	300	6,000	29·4	1-9pr. 6-3prs.	2	62	75
Bélier	Nantes ..	1903	183·9	20·11	10·3	2	300	6,000	28	1-9pr. 6-3prs.	2	62	75
Bombarde	Havre (F.&C.)	1903	183·9	20·11	10·3	2	300	6,000	30·5	1-9pr. 6-3prs.	2	62	75
Bouclier	Normand ..	1910	233·8	24·9	9·7	3	715	15,000	33·4	2-3·9in.4-9pr.	4	62	160
Boutefeu	Bordeaux ..	1909	233·8	24·9	9·7	3	715	13,000	31	2-3 9in 4-9pr.	4	62	160
Branlebas	Normand ..	1907	183·9	21·3	10·3	2	320	5,000	28	1-9prs.6-3prs.	2	62	84
Carabine	Rochefort ..	1902	183·9	20·11	10 3	2	305	6,300	28	1-9pr 6-3prs.	2	62	75
Carabinier	Rouen	1908	210·6	21·9	10·3	3	430	7,200	28	6-9 prs.	3	62	120
Carquois	Rochefort ..	1907	190·3	19·6	10·3	2	335	7,200	30	19-pr.4 3-prs.	2	62	37
Casque	Havre(F.&C.)	1909	233·8	24·9	9·7	3	715	13,000	35·6	2-3 9in.4-9pr.	4	62	160
Catapulte	Havre (F.&C.)	1903	183·9	20·11	10·3	2	300	6,000	28	1 9pr. 6-3prs.	2	62	75
Cavalier	Normand ..	1910	210·6	21·8	10·3	3	469	8,600	31·2	6-9 prs.	3	62	150
Chasseur	Normand ..	1909	210·6	21·9	10.3	3	454	7,200	28	6-9 prs.	3	62	120
Cimeterre	Bordeaux ..	1909	246·0	26	9·7	3	730	13,500	32·7	2-3 9in.4-9pr	4	62	160
Claymore	Normand ..	1906	190·3	20·11	10·3	2	335	6,000	30·3	1-9pr. 6-3prs.	2	62	75
Cognée	Toulon ..	1907	190·3	20·11	10·3	2	335	6,000	28	1-9pr. 6-3prs.	2	62	75
Coutelas	Rochefort ..	1907	190·3	20·11	10·3	2	335	6,000	28	1-9pr. 6-3prs.	2	62	75
Dague..	Bordeaux ..	1910	246·0	26	9·7	3	730	13,000	33·2	2-3 9in.4-9pr.	4	62	160
Dard	Rouen ..	1903	183·9	20·11	10·3	2	310	6,500	29·4	1-9pr. 6 3prs.	2	62	75
Durandal	Normand ..	1899	180·5	20·8	10·3	2	300	5,000	28	1-9pr. 6-3prs.	2	62	84
Epée	Havre(F.&C.)	1900	190·3	20·8	10·3	2	335	5,700	26	1-9pr. 6-3prs.	2	62	75
Epieu	Normand ..	1903	183·9	20·11	10·3	2	300	6,000	28	1-9pr. 6-3prs.	2	62	75
Escopette	Rochefort ..	1900	183·9	20·8	10·3	2	300	5,700	26	1-9pr. 6-3prs.	2	62	75
Etendard	Bordeaux ..	1908	210·6	21·9	10·3	3	430	6,000	28	1-9pr. 6-3prs.	3	..	..
Fanion..	Bordeaux ..	1908	210·6	21·9	10·3	3	430	6,000	28	1-9pr. 6-3prs.	3	..	..
Fanfare	Normand ..	1907	193·9	21·3	10·3	2	320	5,000	28	1-9pr. 6-3prs.	2	62	84
Fantassin	Havre (F.&C.)	1909	210·6	21·8	10·3	3	469	8,600	30·5	6-9 prs.	3	62	150
Fauconneau	Normand ..	1904	210·6	21·9	10·3	3	430	6,000	28	1-9pr. 6-3prs.	3	..	..
Faulx	Nantes ..	1911	233·8	24·9	9·7	3	715	13,000	32	2-3 9in.4-9pr.	4	62	160
Flamberge..	Rochefort ..	1901	183·9	20 8	10·3	2	300	5,700	26	1-9pr. 6-3prs.	2	62	75
Fleuret	Rochefort ..	1907	190·3	20·11	10·3	2	335	6,000	28	1-9pr. 6-3prs.	2	62	75
Fourche	Nantes ..	1909	233·8	24·9	9.7	3	715	13,000	33 8	2-3·9in 4-9pr.	4	62	160
Francisque..	Rochefort ..	1904	183·9	20·11	10·3	2	305	6,300	28	1-9pr. 6-3prs.	2	62	75
Fronde	Bordeaux ..	1903	183·9	20·11	10·3	2	300	6,000	28	1-9pr. 6-3prs.	2	62	65
Gabion	Rouen ..	1907	210·6	21·9	10 3	3	430	6,000	28	1-9pr. 6-3prs.	3	..	..
Glaive..	Rochefort ..	1908	190·3	20·11	10·3	2	335	6,000	28	1-9pr. 6-3prs.	2	62	75
Hache	Toulon ..	1908	190·3	20·11	10·3	2	335	6,000	28	1-9pr. 6-3prs.	2	62	75
Hallebarde	Normand ..	1899	180·5	20·8	10·3	2	305	5,300	27·2	1-9pr. 6-3prs.	2	62	84

N.B.—"F. & C." "Forges et Chantiers." "Normand" means that the boat has been built at that firm's yard at Havre.

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Brazil.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Fuel Capacity.
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Para		1908						7,014	27·25				
Amazonas		1908						6,898	27·17				
Piahuy		1908						6,563	27·21				
Matto Grosso		1908						7,403	27·16				
Parahyba		1909						6,700	27·29				
Rio Grande do N ..	Yarrow ..	1909	240	23·6	10	2	550	7,778	27·27	2 4-in., 4 3 prs.	2	..	140
Alagoas		1909						7,403	27·25				
Santa Catharina ..		1909						6,982	27·30				
Parana		1910						8,877	28·74				
Sergipe		1909						8,554	27·60				
FIRST CLASS—													
Pedro Ivo .. .. .. / Silvado	Elbing ..	1892–3	152	17·1	7·9	2	130	2,200	28	2–1 prs.	3	24	30
Goyaz	Yarrow ..	1907	152·5	15·3	..	3	..	..	26·5	2–3 prs.	2	..	..
Gonzales	Thornycroft	1908	152·5	15 3	..	3	..	..	26·5	2–3 prs.	2	..	..

Five additional destroyers and three large submarines are proposed.
Three submersibles have been launched at Muggiano (F.I.A.T.), Medusa type improved (250–370 tons, 14-8·5 knots). A Special Laurenti submarine salvage and testing vessel is being built, 3800 tons, 328 ft. long, 50 ft. beam.

Chile.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Fuel Capacity.
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Almirante Lynch, Condell, Simpson, Goñi, Williams Robolledo, and Riveros (6)	White	1912 and Bldg.	320	32·6	11·1	3	1850	27,000	31·7	6–4-in. 2 M.	3	..	507
Capitan Orella ..	Laird	1896	210	21·6	5·4	2	300	6,000	30·17	1-12 pr. Q F. 5-6 pr.	2	65	90
Capitan Munoz Gamero	Laird	1896	210	21·6	5·4	2	300	6,000	30·42	1–12 pr. Q.F. 5–6 pr.	2	65	90
Teniente Serrano ..	Laird	1896	210	21·6	5.4	2	300	6,000	30·35	1–12 pr. Q.F. 5 6 pr.	2	65	90
Guardia-Marina Riquelme	Laird	1896	210	21·6	5·4	2	300	6,000	30·09	1-12 pr. Q.F. 5–6 pr.	2	65	90
Capitan Merino Tarpa .. .. .. Capitan O'Brien ..	Laird	1901	210	21·6	5·4	2	350	6,000	30	Do.	2	65	90
FIRST CLASS—													
Injeniero Hyatt, Cirujano Videla, Injeniero Mutilla, Guardia-Marina Contreras, Capitan Thompson, and Teniente Rodriguez (Viper type) ..	Yarrow ..	1896 / 1898	152·6	15·3	7·9	1	140	2,200	27·5 27·2	3-3 pr. Q.F.	3	28	40

The Thompson and Rodriguez were sent out in sections, and put together at Talcahuano and Valparaiso. Submarines [illegible] and Iquique built, Electric Boat Co., N.Y. (400 tons submerged, 8 tubes).

China.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Fuel Capacity.
FIRST CLASS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Cheng-Feng, Fu-Po, Fei-Yun	Elbing ..	1912	..	..	..	..	400	6000	36·8	2 12-pr., 4 3-pr.	2	..	..
Luang Tuan	Trieste ..	1912	..	..	..	..	400	6000	32	2 12-pr., 2 3 pr.	2	..	..
2 boats	Stettin ..	1897	123·5	21·7	..	..	120	..	20	2 1-pr.	3	20	15
Hupeng, Huchung, Hujing, Hungo ..	Kobe	1906–7	..	..	..	..	97	950	23	2 3-pr.	3	..	..
SECOND CLASS—													
1 boat	Foochow ..	19 3	88·6	6·7	3·3	1	30	550	20·5				

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Denmark.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Dimensions. Beam.	Dimensions. Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Fuel Capacity.
First Class—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Ormen	Copenhagen	1907	125	14·3	..	..	98	2,000	26	2 1-pr.	3	..	21
Hajen	Copenhagen	1896											
Havörnen	Copenhagen	1897	154·3	15·4	7·9	2	142	2,317	22·9	1 4·7-in. 1 1-pr.	3	..	..
Söbjörnen	Copenhagen	1898											
Delfinen	Thornycroft	1883	111·5	12·6	6	1	59	620	20	1 mach.	2	14	9
Havhesten	Thornycroft	1888	137·9	14	7	1	94	1,200	22·8	2 1-pr. revs.	4	20	15
Hvalrossen	Thornycroft	1884	114	12·6	6·5	1	64	660	18·7	1 mach.	2	14	10
Makrelen	Copenhagen	1893	140	14·2	7	2	112	1,200	..	..	..	..	16
Narhvalen	Thornycroft	1888	137·9	14	7	1	94	1,200	22·3	2 1-pr. revs.	4	20	15
Nord Kaperen	Copenhagen	1893	140	14·2	7	2	112	1,200	..	2 1-pr. revs	4	..	16
Söløven	Thornycroft	1887	131	14·8	6·8	1	89	1,200	23·3	2 mach.	4	20	14
Söulven	Havre	1880	94·8	10·9	3·9	1	37	450	18·1	..	2	12	5
Springeren	Copenhagen	1891	119	13	4·9	1	81	800	18·3	2 1-pr. revs.	2	20	14
Stören	Thornycroft	1887	131	14·8	6·8	1	89	1,200	23	2 mach.	4	20	14
Sværdfisken	Thornycroft	1881	110	12	6	1	49	600	20·7	1 mach.	2	14	9

Destroyers (230 tons, 27 knots), built, as follows:—Fyvesfisken (Schichau); Sorlddereu (Yarrow), 27·2 knots; Soulven, Spaekhuggeren (Copenhagen dockyard); Tumleren, Vindhunden (Burmeister and Wain). Three others in hand.
Electric submersible Dikkeren, delivered by F.I.A.T. Co., Muggiano, 1909.—Length, 114 ft. 3 in.; beam, 11 ft.; 103-130 tons, 12-7½ knots. Submersibles Havmanden and Havfruen, of the Holland type, built by the Whitehead company, one at Fiume, the other at Copenhagen dockyard.

France.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Dimensions. Beam.	Dimensions. Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Fuel Capacity.
Destroyers—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Arbalète	Normand	1903	183·9	20·11	10·3	2	300	6,000	28	1-9pr. 6-3prs.	2	62	75
Arc	Châlon	1903	183·9	20·11	10·3	2	300	6,000	28	1-9pr. 6-3prs.	2	62	75
Arquebuse	Normand	1902	183·9	20·11	10·3	2	300	6,000	28	1-9pr. 6-3prs.	2	62	75
Baliste	Rouen	1903	183·9	20·11	10·3	2	300	6,000	29·4	1-9pr. 6-3prs.	2	62	75
Belier	Nantes	1903	183·9	20·11	10·3	2	300	6,000	28	1-9pr. 6-3prs.	2	62	75
Bombarde	Havre (F.&C.)	1903	183·9	20·11	10·3	2	300	6,000	30·5	1-9pr. 6-3prs.	2	62	75
Bouclier	Normand	1910	233·8	24·9	9·7	3	715	15,000	33·4	2-3·9in.4-9pr.	4	62	160
Boutefeu	Bordeaux	1909	233·8	24·9	9·7	3	715	13,000	31	2-3·9in 4-9pr.	4	62	160
Branlebas	Normand	1907	183·9	21·3	10·3	2	320	5,000	28	1-9prs.6-3prs.	2	62	84
Carabine	Rochefort	1902	183·9	20·11	10·3	2	305	6,300	28	1-9pr 6-3prs.	2	62	75
Carabinier	Rouen	1908	210·6	21·9	10·3	3	430	7,200	28	6-9 prs.	3	62	120
Carquois	Rochefort	1907	190·3	19·6	10·3	2	335	7,200	30	19 pr.4 3-prs.	2	62	37
Casque	Havre(F.&C.)	1909	233·8	24·9	9·7	3	715	13,000	35·6	2-3 9in.4-9pr.	4	62	160
Catapulte	Havre (F.&C.)	1903	183·9	20·11	10·3	2	300	6,000	28	1 9pr. 6-3prs.	2	62	75
Cavalier	Normand	1910	210·6	21·8	10·3	3	469	8,600	31·2	6-9 prs.	3	62	150
Chasseur	Normand	1909	210·6	21·9	10.3	3	454	7,200	28	6-9 prs.	3	62	120
Cimeterre	Bordeaux	1909	246·0	26	9·7	3	730	13,500	32·7	2-3 9in.4-9pr	4	62	160
Claymore	Normand	1906	190·3	20 11	10·3	2	335	6,000	30·3	1-9pr. 6-3prs.	2	62	75
Coguée	Toulon	1907	190·3	20·11	10·3	2	335	6,000	28	1-9pr. 6-3prs.	2	62	75
Coutelas	Rochefort	1907	190·3	20·11	10·3	2	335	6,000	28	1-9pr. 6-3prs.	2	62	75
Dague	Bordeaux	1910	246·0	26	9·7	3	730	13,000	33·2	2-3 9in.4-9pr.	4	62	160
Dard	Rouen	1903	183·9	20·11	10·3	2	310	6,500	29·4	1-9pr. 6 3prs.	2	62	75
Durandal	Normand	1899	180·5	20·8	10·3	2	300	5,000	28	1-9pr. 6-3prs.	2	62	84
Epée	Havre (F.&C.)	1900	190·3	20·8	10·3	2	335	5,700	26	1-9pr. 6-3prs.	2	62	75
Epieu	Normand	1903	183·9	20·11	10·3	2	300	6,000	28	1-9pr. 6-3prs.	2	62	75
Escopette	Rochefort	1900	183·9	20·8	10·3	2	300	5,700	26	1-9pr. 6-3prs.	2	62	75
Etendard	Bordeaux	1908	210·6	21·9	10·3	3	430	6,000	28	1-9pr. 6-3prs.	3	..	..
Fanion	Bordeaux	1908	210·6	21·9	10·3	3	430	6,000	28	1-9pr. 6-3prs.	3	..	..
Fanfare	Normand	1907	193·9	21·3	10·3	2	320	5,000	28	1-9pr. 6-3prs.	2	62	84
Fantassin	Havre (F.&C.)	1909	210·6	21·8	10·3	3	469	8,600	30·5	6-9 prs.	3	62	150
Fauconneau	Normand	1904	210·6	21·9	10·3	3	430	6,000	28	1-9pr. 6-3prs.	3	..	..
Faulx	Nantes	1911	233·8	24·9	9·7	3	715	13,000	32	2-3 9in.4-9pr.	4	62	160
Flamberge	Rochefort	1901	183·9	20 8	10·3	2	300	5,700	26	1-9pr. 6-3prs.	2	62	75
Fleuret	Rochefort	1907	190·3	20·11	10·3	2	355	6,000	28	1-9pr. 6-3prs.	2	62	75
Fourche	Nantes	1909	233·8	24·9	9.7	3	715	13,000	33 8	2-3·9in 4-9pr.	4	62	160
Francisque	Rochefort	1904	183·9	20·11	10·3	2	305	6,300	28	1-9pr. 6-3prs.	2	62	75
Fronde	Bordeaux	1903	183·9	20·11	10·3	2	300	6,000	28	1-9pr. 6-3prs.	2	62	65
Gabion	Rouen	1907	210·6	21·9	10 3	3	430	6,000	28	1-9pr. 6-3prs.	3	..	..
Glaive	Rochefort	1908	190·3	20·11	10·3	2	335	6,000	28	1-9pr 6-3prs.	2	62	75
Hache	Toulon	1908	190·3	20·11	10·3	2	335	6,000	28	1-9pr. 6-3prs.	2	62	75
Hallebarde	Normand	1899	180·5	20·8	10·3	2	305	5,300	27·2	1-9pr. 6-3prs	2	62	84

N.B.—"F. & C." "Forges et Chantiers." "Normand" means that the boat has been built at that firm's yard at Havre.

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France—*continued*

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement	Fuel Capacity.
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
DESTROYERS—*cont.*													
Harpon	Bordeaux ..	1903	183·9	20·11	10·3	2	300	6,000	28	1 9pr. 6-3prs.	2	62	75
Hussard	Lorient ..	1909	210·6	21·9	10·3	3	430	7,200	28	6-9 prs.	3	63	120
Janissaire	Rouen.. ..	1910	210·6	21·8	10·3	3	469	8,600	28·5	6-9 prs.	3	62	150
Javeline	Nantes ..	1903	183·9	20·11	10 3	2	300	7,000	29·3	1-9pr. 6 3prs.	2	62	75
Lasnquenet	Bordeaux ..	1909	210·6	21·8	10 3	3	469	8,600	28	6-9 prs.	3	62	150
Mameluck	Nantes ..	1909	210·6	21·8	10·3	3	469	8,600	28	6-9 prs.	3	62	150
Massue	Toulon ..	1908	190·3	20·11	10·3	2	335	6,000	28	1-9pr. 6-3prs.	2	62	75
Mortier	Rochefort ..	1906	190·3	20·11	10·3	2	335	6,300	28	1-9pr. 6-3prs.	2	62	75
Mousquet	Nantes ..	1902	183·9	20·11	10·3	2	300	6,300	30 2	1-9pr. 6-3prs.	2	62	75
Mousqueton	Châlon ..	1903	183·9	20·11	10·3	2	300	6,000	28	1-9pr. 6-3prs.	2	62	75
Obusier	Rochefort ..	1907	190·3	20·11	10·3	2	335	6,300	28	1-9pr. 6-3prs.	2	62	75
Oriflamme..	Nantes ..	1908	210·6	21·9	10 3	3	430	6,000	28	1-9pr. 6-3prs.	3	..	..
Pertuisane	Rochefort ..	1900	183·9	20·8	10.3	2	300	5,700	26	1-9pr. 6-3prs.	2	62	75
Pierrier	Rochefort ..	1906	190·3	20·11	10.3	2	335	6,300	28	1-9pr. 63-prs.	2	62	75
Pique	Havre (F.&C.)	1900	190·3	20·8	10.3	2	335	5,700	26	1-9pr. 6-3prs	2	62	75
Pistolet	Nantes ..	1903	183·9	20·11	10.3	2	300	6,000	28	1-9pr. 6-3prs.	2	62	75
Poignard	Rochefort ..	1909	190·3	20·11	10.3	2	335	6,000	28	1-9pr. 6 3prs.	2	62	75
Rapière	Rochefort ..	1901	183·9	20·8	10·3	2	300	5,700	26	1-9pr. 6-3prs.	2	62	75
Sabre	Rochefort ..	1904	183·9	20·11	10·3	2	305	6,300	28	1-9pr. 6-3prs.	2	62	75
Sabretache..	Nantes ..	1908	210·6	21·9	10·3	3	430	6,000	28	6-9 prs.	3	..	..
Sagaie..	Havre (F.&C.)	1902	183·9	20·11	10·3	2	300	6,000	30·1	1-9pr. 6-3prs.	2	62	75
Sape	Rouen ..	1907	210·6	21·9	10·3	3	430	6,000	28	1-9pr. 6-3prs.	3	..	..
Sarbacane	Rochefort ..	1903	183 9	20·11	10·3	2	305	6,300	28	1-9pr 6-3prs.	2	62	75
Spahi	Havre.. ..	1908	210·6	21·9	10 3	3	430	7,200	28	6-9 prs.	3	62	120
Stylet	Rochefort ..	1905	190·3	20·11	10·3	2	335	6,300	..	1-9pr. 6-3prs.	2	62	75
Takou*	Elbing ..	1898	193·7	21·0	..	2	280	6,000	25	6-3 pr. Q.F.	2	62	67
Tirailleur	Bordeaux ..	1908	206 9	21·8	9·7	3	410	7,200	28	6-9 pr.	3	62	120
Tromblon	Rochefort ..	1905	190·3	21 0	10·3	2	335	6,300	25	6-3 pr. Q.F.	3	62	67
Trident	Rochefort ..	1907	190·3	19·6	10·3	2	335	7,200	30	1-9pr. 6-3prs.	2	62	37
Voltigeur	Nantes ..	1909	210·6	21·9	10·3	3	430	7,200	28	6 9 prs.	3	62	120
Yatagan	Nantes ..	1900	190 3	20·8	10·3	2	335	5,700	26	1-9pr. 6-3, rs.	2	62	33
Bory, Garnier, Rivière, Mehl, Pehorter (5)	Normand, &c.	1911	243	24·9	10 0	2	740	14,500	31	2 3 9-in., 4 9 prs.	4	81	120
Bisson, Renaudin, Protet, Magon, Comm. Lucas, Mangini (6)	Toulon, etc.	1912 & Bldg	243	24·9	10 0	3	750	15,000	31	2 3 9-in., 4 9 prs.	2 dbl.	81	120
Henry, Herbert (2).. ..	Rochefort ..	1911	214·6	21·6	7 8	3	450	8,600	28·5	6 9 prs.	3	62	50
Foux, Lestin, Gabolde (3)	Rochefort & Normand	Bldg.	266	25·6	10·0	2	880	17,000	32	2 3·9 in., 4 9 prs.	2 dbl.	81	..
SEA-GOING—													
Aquilon	Normand ..	1895	137·8	14·6	7·9	2	127	2,000	26·17	2-3 prs.	2	34	17
Audacieux..	Nantes ..	1900	144·2	15·2	10·0	2	152	4,200	30	2-3 prs.	3	..	18
Borée	Bordeaux ..	1900	147·7	16·7	8·0	2	160	4,400	30	2-3 prs.	2	..	18
Bourrasque	Normand ..	1901	147·7	16·7	8·0	2	160	4,400	31·41	2-3 prs.	2	..	18
Chevalier	Normand ..	1893	144·3	15·7	6·8	2	131	2,700	27·2	2-1 prs.	2	32	17
Cyclone	Normand ..	1898	144·2	15·2	10·0	2	152	4,200	30	2-3 prs.	2	..	18
Flibustier	Normand ..	1894	143	16·4	9·3	2	132	1,500	23·5	2-3 prs.	2	34	16
Forban	Normand ..	1895	144·2	15·2	10	2	135	3,200	31·2	2-1 prs.	2	..	..
Grenadier	Normand ..	1892	138	14·7	8·2	2	129	1,400	25·25	2-3 prs.	2	29	15·5
Grondeur	Havre (F.&C.)	1892	147·5	14·5	5	2	130	1,550	24	2-3 prs.	2	27	20
Mistral	Normand ..	1901	147·7	16·8	8·8	2	182	4,200	30	2-3 prs.	3	..	23
Rafale..	Normand ..	1901	147·7	16·7	8·0	2	160	4,400	31·47	2-3 prs.	2	..	18
Simoum	Havre (F.&C.)	1901	144 2	15·2	10·0	2	152	4,200	30	2-3 prs.	3	..	18
Siroco	Normand ..	1901	147·7	16·8	8·8	2	182	4,200	30	2-3 prs.	3	..	23
Tramontane	Bordeaux ..	1900	147·7	16·7	8·0	2	160	4,400	30	2-3 prs.	2	..	18
Trombe	Nantes ..	1900	144 2	15·2	10·0	2	152	4,200	30	2-3 prs.	3	..	18
Typhon	Havre (F.&C.)	1901	144·2	15·2	10 0	2	152	4,200	30	2-3 prs.	3	..	18
FIRST CLASS—													
212-215 (4 boats).. ..	Normand ..	1899	121·4	13·6	8·6	1	86	1,800	27	2-1 prs.	2	23	10
216-226 (11 boats).. ..	Cherbourg, Toulon, etc.	1899-1902	121·6	13·6	8·6	1	86	1,500	23·5	2-1 prs.	2	23	10
227-235 (8 boats).. ..	Bordeaux, etc.	1901	121·4	13·2	8·7	1	86	1,500	23·5	2-1 prs.	2	23	10
236-255 (20 boats) ..	Bordeaux, etc.	1902	121 4	13·2	8·7	1	90	1,500	23·5	2-1 prs.	2	23	10
256-257 (2 boats).. ..	Bordeaux etc.	1900	124·8	13·2	8·7	1	97	2,000	26·0	2-1 prs.	3	24	10
258-261 (4 boats).. ..	Bordeaux ..	1902	124·8	13·2	8·7	1	97	2,000	26·0	2-1 prs.	3	24	10
262 (1 boat)..	Creusot ..	1902	124·8	13·2	8·7	1	97	2,000	26·0	2-1 prs.	3	24	10
264-265 (2 boats).. ..	Bordeaux ..	1902	124·8	13·2	8·7	1	97	2,000	26·0	2-1 prs.	3	24	10
266-276 (11 boats) ..	Bordeaux etc.	1902	124 8	13·2	9·6	1	97	2,000	26·0	2-1 prs.	3	24	10
277-294 (18 boats) ..	Bordeaux, etc.	1904	124·8	14·0	9·6	1	97	2,000	26·0	2-1 prs.	3	26	10
295-317 (23 boats) ..	Normand, etc.	1905											
318-367 (50 boats) ..	Havre, etc.	1905-7	124·8	14·0	9·6	1	97	2,000	26	2-1 prs.	3	26	10
368-369 (2 boats).. ..	Toulon ..	1906											

* Captured from the Chinese at Taku, 1900.

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France—*continued.*

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.
			Feet.	Feet.	Feet.		Tons.		Knots.			
SUBMARINES—												
Aigrette	Toulon ..	1904	117·6	12·9	8·3	1	172	200	10·5	..	..	20
Algérien	Cherbourg ..	1901	118	9·2	..	1	146	250	8–13	..	..	9
Alose	Toulon ..	1903	77	7·6	8·0	1	68	60	8	..	..	5
Anguille	Toulon ..	1903	77	7·6	8·0	1	68	60	8	..	..	5
Bonite..	Toulon ..	1903	77	7·6	8·0	1	68	60	8	..	..	5
Calypso	Toulon ..	19·7	154·3				314				7	..
Castor	Rochefort ..	1903	77	7·6	8·0	1	68	60	8	..	..	5
Cigogne	Toulon ..	1904	117·6	12·9	8·3	1	172	200	10·5	..	..	20
Circé	Toulon ..	1907	154·3				314				7	..
Dorade	Toulon ..	1903	77	7·6	8·0	1	68	60	8	..	..	5
Emeraude	Cherbourg ..	19 6	146	12·9	12·0	2	390	600	12	..	6	16
Espadon	Cherbourg ..	1901	111·6	12·4	5·4	1	106–200	250	8–12	..	2	10
Esturgeon	Toulon ..	1903	77	7·6	8·0	1	68	60	8	..	..	5
Follet	Rochefort ..	1901	135·8	9 5	9·5	1	185	..	8–12¼	..	..	9
Français	Cherbourg ..	1901	118	9·9	..	1	146	250	8–13	..	..	9
Gnome	Rochefort ..	1901	135·8	9·5	9·5	1	185	..	8–12¼	..	..	9
Grondin	Toulon ..	1903	77	7·6	8·0	1	68	60	8	..	..	5
Korrigan	Rochefort ..	1901	135·8	9·5	9·5	1	185	..	8–12¼	..	..	9
Loutre	Rochefort ..	1903	77	7·6	8·0	1	68	60	8	..	..	5
Ludion	Cherbourg ..	1902	77	7·6	8·0	1	68	60	8	..	..	5
Lynx	Cherbourg ..	1902	77	7·6	8·0	1	68	60	8	..	..	5
Méduse	Rochefort ..	1903	77	7·6	8·0	1	68	60	8	..	..	5
Naiade	Cherbourg ..	1902	77	7·6	8·0	1	68	60	8	..	..	5
Opale	Cherbourg ..	1906	146	12·9	12·0	2	390	600	12	..	6	..
Otarie	Rochefort ..	1903	77	7·6	8·0	1	68	60	8	..	..	5
Oursin	Rochefort ..	1903	77	7·6	8·0	1	68	60	8	..	..	5
Perle	Cherbourg ..	1903	77	7·6	8·0	1	68	60	8	..	..	5
Phoque..	Rochefort ..	1904	77	7·6	8·0	1	68	60	8	..	..	5
Protée	Cherbourg ..	1902	77	7·6	8·0	1	68	60	8	..	..	5
Rubis	Cherbourg ..	1907	154 3	12·9	12·0	2	390	600	12	..	6	16
Saphir	Toulon ..	1908	146	12·9	12·0	2	390	600	12	..	6	..
Silure	Cherbourg ..	1901	111·6	12·4	5·4	1	106–200	250	8–12	..	2	10
Sirène	Cherbourg ..	1901	111·6	12·4	5·4	1	106–200	250	8–12	..	2	10
Souffleur	Toulon ..	1903	77	7·6	8·0	1	68	60	8	..	..	5
Thon	Toulon ..	1903	77	7·6	8·0	1	68	60	8	..	..	5
Topaze	Cherbourg ..	1908	146	12·9	12·0	2	390	600	12	..	6	..
Triton	Cherbourg..	1901	111·6	12·4	5·4	1	106–200	250	8–12	..	2	10
Truite	Toulon ..	1903	77	7·6	8·0	1	68	60	8	..	..	5
Turquoise	Toulon ..	1908	146	12·9	12·0	2	390	600	12	..	6	..
Dauphin	Cherbourg ..	1904	122·8	10·2	7·6	2	168	220	10¼	..	..	..
Argonaute	Toulon ..	1905	160·6	13·9	9.0	1	301	330	11	..	4	20
Pluviôse, Ventôse, Nivôse, Germinal, Floréal, Prairial, Messidor, Thermidor, Fructidor, Brumaire, Frimaire	Cherbourg ..	1907 to 1912	160	16·4	13·6	2	398	700	7¼–12¼	..	7	24
Papin, Fresnel, Berthelot	Rochefort ..	1908 1909	160	16·4	13·6	2	398	700	7¼–12¼	..	7	24
Monge, Ampère, Gay-Lussac	Toulon ..	1908 & 1909	160	16·4	13·6	2	398	700	7¼–12¼	..	7	24
Foucault, Euler, Franklin, Watt, Cugnot, Giffard, Faraday, Volta, Newton, Montgolfier, Bernouilli, Joule, Coulomb, Arago, Curie, Le Verrier, (16, Prog. 1905–6)	Cherbourg .. Rochefort .. Toulon ..	1909 1912	160	16·4	13·6	2	390	340	7¼–12¼	..	7	24
Amiral Bourgeois	Cherbourg	1912	184·6	26·3	..	2	555–735	1,560	10–15	..	7	25
Archimède		1909	211·9	30·2	..	2	577–810	1,700	10–15	..	7	27
Mariotte		1911	212·6	..	..	2	530–625	1,440	10–15	..	6	25
Charles Brun		1910	144 6	13·6	..	2	355–450	1,300	10–15	..	7	20
Clorinde, Cornélie, Amphitrite, Astrée, Artémis, Aréthuse, Atalante, Amaranthe, Ariane, Andromaque	Rochefort ..	1913 & bldg.	174	16 9	10·9	2	394	1,300	15·8	..	8	20
Gustave Zédé .. .. Néréide	Cherbourg ..	1913	239 6	19·8	14·4	2	787–1000	4,000	10–20	..	8	[illegible]0
Bellone, Hermione, Gorgone	Rochefort .. Toulon ..	Bldg.	193·9	18 0	11·9	2	512	2,100	17·5	..	8	[illegible]9

Daphné and Diane, 620 tons, 1800 H.P., 10 tubes, building at Cherbourg; Dupuy de Lôme, Sané, Joessel, Fulton, Laplace, Lagrange, Regnault and Q 114 820 tons, 4000 H.P., 10 tubes, building at Cherbourg Rochefort and Toulon (Estimates of 1913 and 1914).

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Germany.

Name or Number.	Where built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Fuel Capacity.
DESTROYERS—			Feet.	Feet.	Feet.		Tons		Knots.				Tons.
D 3, D 4 (2 boats)	Elbing ..	1888	184	21·8	9·6	2	300	2,000	20	4 6-pr. 2 1-pr. revs.	3	48	90
D 5, D 6 (2 boats)	Elbing ..	1888–9	190 3	23	9 6	2	320	3,000	22¼	4 6-pr. 2 1-pr. revs.	3	48	90
D 7, D 8 (2 boats)	Elbing ..	1890	190·3	23	9·9	2	380	3,500	22¼	6 Q F.	3	..	..
D 9	Elbing ..	1894	197·0	24 3	9·9	2	380	4,500	26	6 Q.F.	3	..	..
D 10	Chiswick ..	1898	211·9	19 6	8·1	2	310	5,800	28·5	5 3-pr.	3	52	80
Taku (ex Hai Ying)	Elbing ..	1898	183·7	21·0	..	2	280	6,000	30	6 3-prs.	2	..	67
S 90-101 (12 boats)	Elbing ..	1900	200	23	8·9	2	350	6,000	27 5	3 3-pr.	3	..	..
S 102-107 (6 boats)	Elbing ..	1900–1	200	23	8·9	2	350	6,000	27·5	3 3-pr.	3	..	..
G 108-113 (6 boats)	Kiel(Germania)	1901–2	200	22	8·9	2	350	6,000	29·2	3 3-pr.	3	49	100
S 114-119 (6 boats)	Elbing ..	1902–3	200	23	8·9	2	350	6,000	29·2	3 3-pr.	3	49	100
S 120-125 (6 boats)	Elbing ..	1904	200	23	8·9	2	350	6,000	29·2	3 3-pr.	3	49	100
S 126-131 (6 boats)	Elbing ..	1904–5	205	23	..	2	420	6,000	30	3 6-pr.	3	56	100
G 132-136 (5 boats)	Kiel(Germania)	1906	207·4	23	8·9	2	420	6,500	28	4 6-pr.	3	..	..
G 137	Kiel(Germania)	1907	226·4	25·4	9 8	3	570	10,000	32	1 14-pr.3 3 pr.	3	72	170
S 138-149 (12 boats)	Elbing.. ..	1906–7	331	25·7	8·9	2	530	10,000	30	1 23-pr.3 4-pr.	3	72	170
V 150-161 (12 boats)	Stettin(Vulcan)	1907–8	269	25·7	10·0	2	670	10,500	30	2 23-pr. 2 M.	3	83	175
V 162-164 (3 boats)	Stettin(Vulcan)	1908–9	212·9	..	9·9	2	616	14,000	30	2 23-pr. 2 M.	3	..	160
S 165-168 (4 boats)	..	..	242	..	9·9	2	616	15,000	..	..	..	..	..
G 169-173 (5 boats)	Kiel(Germania)	1908–9	242	..	9·6	2	616	14,000	30	2 23-pr. 2 M.	3	..	160
G 174-175 (2 boats)	Kiel(Germania)	1909											
S 176-179 (4 boats)*	Elbing ..	and	233	25·9	7·6	..	640	15,000	32·5	2 23-pr. 2 M.	3	83	180
V 180-185 (6 boats)	Stettin(Vulcan)	1910											
G 186-191 (6 boats)	Kiel(Germania)	1910	233	25·9	7·6	..	640	15,000	32·5	2 23-pr. 2 M	3	83	180
V 192-197 (6 boats)	Stettin(Vulcan)	1911	233	25·9	7·6	..	640	15,000	32·5	2 23-pr. 2 M	3	83	180
V 1-V 6 (6 boats)	Stettin(Vulcan)	1911	532	24·3	7·9	2	561	15,000	32·5	2 23-pr. 2 M.	3	73	160
G 7-G 12 (6 boats)	Kiel(Germania)	1912	532	24·3	7·9	2	555	15,000	32·5	2 23-pr. 2 M.	3	73	160
S 13-24 (12 boats)	Elbing ..	1912 1913	232·5	24·3	9·9	2	555	15,000	32·5	2 23-pr. 2 M.	4	83	146
V 25-30 (6 boats)	Stettin(Vulcan)	1913	..	..	..	..	..	..	32·5	2 23-pr. 4 M.	..	..	..
S 31-36 (6 boats)	Elbing ..	1914											
FIRST CLASS—													
T 42—T 47 (6 boats)	Elbing ..	1892	150	15·6	6·7	..	85–88	1,600	20–22¼	2 1-pr. revs.	2	..	17
T 49—T 57 (9 boats)	Elbing ..	1893	154·3	16·4	..	2	110 145	1,600	..	..	3	..	..
S 58—S 87 (30 boats)	Elbing ..	1894–8	158·2	16·9	9·0	2	140	2,300	26	2 1-pr. revs.	3	..	32
G 88—G 89 (2 boats)	Kiel(Germania)	1898	154 3	16·5	..	..	160	2,500	26	2 mach.	3	22	..

NOTE.—The German destroyers (from S 90 downward) are given above in groups showing successive yearly programmes the last series being that of 1912. The Estimates of 1914 provide for the building of two divisions of destroyers (12 boats).

A submarine boat (U 1), 180 tons, 128 ft. long, 8 ft. 10 in. beam, submerged displacement 240 tons, speed 12 and 9 knots, launched at the Germania Yard, August 30, 1905; U 2 to U 21 built at Germania Yard and Danzig; others building; U 21, 800 tons, 17–12 knots, two guns. The V destroyers have A.E.G. turbines; S boats, Schichau; and most of the G boats Parsons turbines (G 173, Zoelly).

* S 178 sunk in collision with the Yorck, March 4th.

Greece.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught	Number of Screws.	Displacement	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Naukratoussa ..	Yarrow ..	1906	220	20·6	7·2	2	350		32·1	2 12, 4 6-pr.	2	58	80
Thyella									31·79				
Sphendoni									31·84				
Lonchi									32·53				
Nike..	Stettin (Vulkan)	1906	220	20·6	7·2	2	350	..	30	2 12, 4 6-pr.	2	58	80
Aspis													
Doxa..													
Velos													
Aetos, Leon, Pardalos, Jerex	Birkenhead	1911	285	29·9	9·6	..	980	19,750	32	4 4-in.	4	110	225
Keravnos .. .. .. Neagenea	Stettin ..	1911	..	..	..	..	750	..	32·5	4 3·4-in.	2	..	..
SUBMARINES—													
Delphin, Xiphias ..	Chalon sur Saône ..	1911–12	164	..	..	..	300–460	..	14·9	..	5	..	..

Six 125-ton torpedo-boats built by the Vulcan Co. at Stettin; Arethusa, Doris, Aigli, Dafni, Alcyon, Thetis.

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Italy.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Dimensions. Beam.	Dimensions. Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Fuel Capacity.
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Destroyers—													
Fulmine	Sestri (Odero)	1898	200	20·4	5·4	2	298	4,800	28	5 6-pr. Q.F.	2	43	60
Lampo													
Freccia													
Dardo	Elbing	1899								1 14-pr. Q.F.,			
Strale	(Schichau)	1901	196·8	21·3	5·8	2	320	6,000	30	5 6-pr.	2	53	60
Euro													
Ostro													
Nembo													
Turbine													
Aquilone	Naples	1901	210	19·4	7·6	2	330	6,000	30	5 6-pr. Q.F.	2	53	60
Borea	(Pattison)	1902											
Meteoro													
Tuono													
Zeffiro	Naples	1904	210	19·4	7·6	2	330	6,000	30	5 6-pr. Q.F.	2	53	60
Espero	(Pattison)												
Bersagliere													
Artigliere		1906											
Granatiere		1907											
Lanciere													
Alpino	Genoa		211·6	20·0	7·6	3	365	6,000	30	4 14-pdr.	3	55	82
Corazziere	(Ansaldo)												
Pontiere													
Carabinieri		1909											
Fucilieri		1910											
Garabaldino													
Impavido													
Impetuoso		1912											
Indomito	Naples	&	246	24·6	7·6	..	650	15,000	35·2	1 4·7 in.	2	..	100
Insidioso	(Pattison)	Bldg.								4 14-pr.			
Intrepido													
Irriquieto													
Ardito		1912											
Ardente	Orlando	&	246	24·6	7·6	..	650	15,000	35·5	1 4·7 in.	2	..	..
Audace	(Leghorn)	1913								4 14-pr.			
Animoso													
Ascaro	Ansaldo	1912	211·5	20·0	6·6	..	380	6,000	29	2 14-pr.	3	..	80
Francesco Nullo										4 6-pr.			
Antonio Mosto	Naples												
Guiseppe Sirtori	(Pattison)												
Giacinto Carini													
Rosolino Pilo		Bldg.	246	24·6	7·6	..	669	18,000	35	1 4·7-in.	2	..	..
Guiseppe Abba										4 14-pr.			
Simone Schiaffino	Genoa												
Pilade Bronzetti	(Odero)												
Guiseppe Missori													
Ippolito Nievo													
First Class—													
Aquila, Sparviero										2 3-pr. Q.F.,			
Nibbio, Avvoltoio	Elbing	1888	152	17·2	7·9	2	130	2,200	26·6	1 1-pr. Q.F., 1 1-pr. rev.	3	24	40
Pellicano	Sestri (Odero)	1899	157·4	19	14·8	2	147	2,700	25	2 3-pr.	2	28	24
Condore	Sestri (Ansaldo)	1898	154·3	16·8	6·9	2	136	2,500	27	2 3-pr.	2	27	16
Sirio, Sagittario		1905–6											
Spica, Scorpione	Elbing	1905–6											
Serpente, Saffo		1905–6											
Alcione, Ardea		1905						2,900					
Albatros, Aiorone	Odero	1906	164	19·6	6·3	2	215	3,250	25	2 3-pr.	2	..	40
Astore, Arpia													
Crione, Orsa	Genoa	1905											
Olympia, Orfeo	(Ansaldo)	1906											
Gabbiano	Spezia	1907											
Pegaso	Naples (Pattison)	1905											
Perseo		1905											
Procione		1905											
Pallade													
Cigno													
Cassiopea	Naples	1906	164	17·4	7·0	2	200	3,000	25·4 / 26·6	3 3-pr.	3		40
Calliope	(Pattison)	1907											
Clio		1906											
Centauro		1907											
Canopo		1907											
Calipso	Naples	1909											
Climene	(Pattison)	1909											
1 P.N.-12 P.N.	Pattison	1912											
13 O.S.-24 O.S.	Odero	&											
25 A.S.-32 A.S.	Ansaldo	1913	139	13·9	..	..	130	2,500	27	1 6-pr.	2	..	..
33 P.N.-38 P.N.	Pattison												
39 R.M. 40 R.M.	Spezia	Bldg.											

Destroyers, 1,000 tons, 35 knots, are to be built, to which the following names have been assigned: Alessandro Poerio, Cesare Rossarol, Guglielmo Pepe, Carlo Mirabello, Carlo Alberto Racchia, Augusto Riboty.

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Italy—*continued.*

Name or Number	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Fuel Capacity.
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
SECOND CLASS—													
No. 117	..	1895	131·2	16·4	..	1	85	1,000	..	2 1 pr. Q.F.	2	17	17
Nos. 136–8, 140–2 (6 boats)	Italy	1893–94	131·2	16·4	..	1	85	1,000	22	2 1-pr. Q.F.	2	17	17
Nos. 147, 149–152 (5 boats)	Italy ..	1894–5	131·2	16·4	..	1	85	1,000	22	2 1-pr. Q.F.	2	17	17
SUBMARINE—													
Delfino	Spezia	1894	78·6	10·1	..	1	111	150	10–12	..	2	12	..
Glauco, Squalo, Narvalo, Otaria, Tricheco	Venice, &c.	1906 1907 1909	120	14·3	..	..	180 / 230	..	15	..	2	..	..
Foca, Medusa, Velella, Argo, Jalea .. Jantina, Salpa .. Fisalia, Zoea	Muggiano F.I.A.T. S. Giorgio	1908 to 1913	148	13·9	..	..	225 / 320	750	14·6 / 8·5	..	2	..	..
Nautilus, Nereide ..	Venice ..	Bldg.	134·6	14·2	..	..	221 / 297	600	19–5	..	3	..	..
G. Pullino, G. Ferraris	Spezia ..	1912	134·6	14·9	..	..	345 / 400	1200	15–9	..	4	17	..
Atropo	Kiel (Germania)	1912	146	14·6	..	..	330	700 / 400	12¼ / 8½	..	2	..	..

The following large submarines are to be built: Galvani, Torricelli, and another (Spezia), Lazzaro Mocenigo, Lorenzo Marcello, Angelo Zeno (Venice).

Japan.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Fuel Capacity.
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
DESTROYERS—													
Murakumo	Thornycroft	1898											
Shinonome	Thornycroft	1898											
Yugiri	Thornycroft	1898							30 to 31				
Shiranui	Thornycroft	1899	210·0	19·5	7·2	2	307	5,800		1 12-pr., 5 6-prs.	2	54	80
Kagerou	Thornycroft	1899											
Usugumo	Thornycroft	1900											
Shirakumo	Thornycroft	1901	216·7	20·7	8·3	2	373	7,400	31	1 12-pr., 5 6-prs.	2	59	96
Asashio	Thornycroft	1902											
Akebono	Yarrow ..	1899	220·0	20·6	9·6	2	311	6,000	31	1 12-pr., 5 6-prs.	2	55	95
Sazanami	Yarrow ..	1899											
Oboro	Yarrow ..	1899	220·3	20·6	9·6	2	311	6,000	31·62	1 12-pr., 5 6-prs.	2	..	90
Niji	Yarrow ..	1899	220·3	20.6	9·6	2	308	6,000	31·15	1 12-pr., 5 6-prs.	2	..	90
Kasumi	Yarrow ..	1902	220·3	20·6	9·6	2	335	6,000	31	1 12-pr., 5 6-prs.	2	..	..
Asagiri	Yokosuka ..	1902	220·3	20·6	9·6	2	374	6,000	29	1 12-pr., 5 6-prs.	2	..	..
Murasame	Yokosuka ..	1902											
Yamahiko	Port Arthur	1903											
Fumizuki	Port Arthur	1903	196·9	18·4	11·5	2	250	6,000	27	1 12-pr., 5 3-prs.	2	..	80
Satsuki	St. Petersburg	1902											
Hatsushima	Yokosuka ..	1905											
Yayoi	Yokosuka ..	1905											
Kisaragi	Yokosuka ..	1905											
Hibiki	Yokosuka ..	1906											
Wakaba	Yokosuka ..	1905											
Hatsuyuki	Yokosuka ..	1906											
Kamikaze	Yokosuka ..	1905											
Ariake	Yokosuka ..	1905											
Fubuki	Yokosuka ..	1905											
Arare	Yokosuka ..	1905											
Yunagi	Maizuru ..	1906											
Oite	Maizuru ..	1905	220·3	20·6	9·6	2	374	6,000	29	6 12-pr.	2	..	..
Asakase	Kobe	1905											
Harukase	Kobe	1905											
Shigure	Kobe	1906											
Hatsuharu	Kobe	1906											
Yuguri	Sasebo	1905											
Yudachi	Sasebo	1906											
Mikadzuki	Sasebo	1906											
Nowake	Sasebo	1906											
Uschio	Kure	1905											
Nenohi	Kure	1905											
Shiratsuyu	Nagasaki ..	1906											
Shirayuki	Nagasaki ..	1906											

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Japan—*continued.*

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Fuel Capacity.
DESTROYERS—*contd.*			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Matsukase	Nagasaki ..	1906											
Shirotaye ..	Nagasaki ..	1906											
Asatsuyu	Osaka	1907											
Hayakase	Osaka	1906											
Kikutsuki	Uraga	Bldg.											
Minatsuki	Uraga	Bldg.	220·3	20·6	9·6	2	374	6,000	29	6 12-prs.	2	70	90
Nagatsuki	Uraga	1907											
Utsuki	Uraga	1907											
Isonami	Yokosuka ..	1909											
Uranami	Yokosuka ..	1909											
Ajanami	Yokosuka ..	1909											
Kaifu	Maizuru ..	1909											
Umikaze	Nagasaki ..	1910	..	..	..	..	1200	20,500	35	2 4·7-in., 5 3 in.	3	123	..
Yamakase	..	1911											
Sakura	Kure	1912	..	..	..	..	600	18,000	33	1 4·7 in., 4 12-pr.	4	..	..
Tashibana	Kure	1912											
C. D...	Yarrow ..	Bldg.	..	..	..	..	950	22,000	30	3 3·9-in.	4	..	..
FIRST CLASS—													
Hayabusa..	Normand ..	1898											
Kasasagi	Normand ..	1899											
Manadzuru	Normand ..	1899	147·7	16·0	8·2	2	150	4,200	30	1 6-pr., 2 3-prs.	3	26	30
Chidori	Normand ..	1900											
Shirataka..	Elbing ..	1899											
Aoataka	Kure	1903											
Hato	Kure	1903											
Hibari	Kure	1903											
Kari	Kure	1903											
Kiji	Kure	1903	147·7	16·0	8·2	2	150	4,200	27	1 6-pr., 2 3-prs.	3	26	30
Tsubame	Kure	1903											
Hashitaka	Kawasaki ..	1902											
Kamone	Kure	1904											
Otori	Kawasaki ..	1904											
Sazi	Kure	1902											
Uzuri	Kure	1902											
SECOND CLASS—													
2 boats	Kobe	1901	..	..	..	..	83	..	..	..	..	..	..
10 boats	Yarrow ..	1900	152·6	15·3	7·9	..	..	1,900	27	2 3-prs	3	..	36
16 boats	Elbing ..	1891-9	..	..	..	..	..	..	..	..	..	..	..
1 boat (No. 24) ..	Normand ..	1891	118	13·1	6·9	1	80	1,200	23	2 1-prs.	2	21	10
2 boats	Normand ..	1898	121·4	13·6	8·6	1	86	1,800	27	1 3-pr.	2	..	10
SUBMARINES—													
5 boats	[U.S.A. Fore River,	1904-5	65	12	..	..	120	..	8	..	1	..	..
2 boats	Japan	1906	..	..	..	..	60·80	..	..	..	1	..	..
2 boats	Vickers ..	1908	135	13·5	..	..	3.5	..	14	..	2	..	..
4 boats	Kawasaki ..	1911 & Bldg.	..	..	..	..	..	..	..	..	..	..	..
2 boats	Schneider ..	Bldg.	..	..	..	..	..	..	..	..	..	..	..

Portugal.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Fuel Capacity.
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Tejo	Lisbon ..	1901	..	..	..	..	..	7000	25·5	1 4-in., 5 M.	2	..	..
Douro	Lisbon ..	1913	240	23·6	..	..	700	11,000	27	1 4-in., 2 12 pr.	2	..	..

Six 32-knot destroyers are in the 1912 programme. There are four obsolete torpedo-boats and three have been built in France. Submarine Espadarte, 245-300 tons, 13 knost, built at the F.I.A.T.-San Giorgio Yard, Muggiano; three others (Laurenti type) are to be built.

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Netherlands.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Fuel Capacity.
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Wolf, Fret (1909); Bulhond, Jakhals (1910); Hermelyn, Lynx, Panter, Vos (1911)	Flushing	1910–1913	230	20·6	9	2	480	7,500	30	4 12-pr., 4 M.	2	84	80
FIRST CLASS—													
Hydra	Yarrow	1900	130	13·6	6·0	1	77	1,200	24·4	2 1 prs.	3	18	20
Ophir	Yarrow	1901	152·6	15·3	7·9	1	130	1,900	27	2 3-prs.	2	25	36
Pangrango	Yarrow	1901	152·6	15·3	7·9	1	130	1,900	27	2 3-prs.	2	25	36
Rindjani	Yarrow	1901	152·6	15·3	7·9	1	130	1,900	27	2 3-prs.	2	25	36
Smeroe	Fijenoord	1904	152·6	15·3	7·9	1	130	1,900	27	2 3-prs.	2	25	36
Tangka	Fijenoord	1904	152·6	15·3	7·9	1	130	1,900	27	2 3-prs.	2	25	36
Wajang	Fijenoord	1904	152·6	15·3	7·9	1	130	1,900	27	2 3-prs.	2	25	36
Minotaurus, Python	Flushing	1904	152·6	15·3	7·9	1	130	1,900	27	2 3-prs.	2	25	36
Zeeslang, Krokodil, Draak, Sfinx, Scylla	Flushing	1905	152·6	15·3	7·9	1	130	1,900	27	2 3-prs.	2	25	36
Meijndert Jentjes, Johan van Brakel, Van de Rijn, Willem Willemsz	Flushing, Rotterdam, & Fijenoord	1904	154·3	16·5	7·9	1	144	2,000	25	2 3-prs.	3	24	40
Roemer Vlacq, Pieter Constant, Jacob Cleydijk, Janssen de Haan	Do.	1906	154·3	16·5	7·9	..	144	2,000	26	2 3-prs.	3	24	40
G 17–20; G 21–22; G 23–24	Stettin (Vulcan); Scheldt; Fijenoord	Bldg.	..	..	..	..	350	..	..	..	4	..	..

The Yarrow destroyers have Yarrow water-tube boilers, and the later ones are fitted for the consumption of oil fuel.
Submarine boat, No. 1 (120 tons) Nos. 2 and 3, 132–150 tons, 11–8 knots, 2 tubes. Nos. 4 and 5 380 tons, 151 ft. 6 in. long, 16 knots (surface), 11 knots (submerged) speed. K 1 for the East Indies, 320–390 tons, 105 ft. long, 10 ft. beam, 300 h.p. (Diesel), and 300 h.p. (electric), 16 knots (surface), 11 knots (submerged speed), 2 tubes, K 2 and K 3, of the same class, are being built for the Dutch Indies, and two others, Nos. 6 and 7, were put in hand (1913). Eight 200-ton boats for home service are to be built.

Norway.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Fuel Capacity.
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Valkyrien	Elbing	1896	190	24·3	9·3	1	374	3,300	23·2	2 12-pdrs., 4 1-pdrs.	2	59	90
Draug; Troll; Garm	Christiania; Christiania; Christiania	1908; 1909; 1913	226	25·0	..	2	550	7,500	27·0	6 12-pdrs.	3	71	95
FIRST CLASS—													
Varg (8), Raket (9)	Christiania	1894	111·5	12·4	..	1	43	..	..	..	2	..	..
Hval, Delfin, Hai (3 boats)	Elbing	1896	128·0	15·0	6·9	1	84	1,100	24·5	2 1·4-in.Q.F.	2	..	..
Storm, Brand, Trods	Christiania	1899	128·0	15·0	..	1	84	1,100	23	2 1·4-in. Q.F.	2		
Laks, Sild, Sael, Skrei	Christiana	1900	128·0	15·0	6·9	1	84	11,000	23	2 1·4-in.	2	..	..
Kjeck, Hvas, Dristig, Kvik, Djerv, Blink, Glint, Hauk, Falk	Christiana	1898 1903	111·5	14·5	6·3	1	65	650	19	2 1·4-in.	2	..	..
Skarv, Teist, Lom, Jo, Grib	Christiana	1906–7	134·5	14·9	..	1	100	1,700	25·0	2 3-pr.	..	..	..
Ravn, Orn	Christiana	1903	119	14·9	6·4	1	73	1,035	22·5	2 1·4-in.	2	14	13
SUBMARINES—													
A 1, 2, 3, 4, 5	Germania Kiel	1909 to 1913	131·6	14·9	9·6	2	220 / 255	440 / 250	12 / 9	..	3	17	..

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Roumania.

Name or Number.	Where Built.	Launched.	Dimensions. Length	Dimensions. Beam.	Dimensions. Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Fuel Capacity.
DESTROYERS—			Feet.	Feet	Feet.		Tons.		Knots.				Tons.
Four	Naples (Pattison)	Bldg.	312	31·0	10·0	2	1330 1450	40,000	35	3 4·7-in. 7 12-pdrs.	2	..	..
FIRST CLASS—													
Naluka	Havre	1888	120·7	11·3	6·9	1	56	578	21	1 1-pr. rev.	2	..	12
Sborul	Havre	1888	120·7	11·3	6·9	1	56	578	21	1 1-pr. rev.	2	..	12
Smeul	Havre	1888	120·7	11·3	6·9	1	56	578	21	1 1-pr. rev.	2	..	12

8 100 ft. Torpedo Vedette Boats built by the Thames Iron Works. 4 built by Schichau, 1904, Vedea, Argosul, Trotosul, Teleorman, for the Danube.

Russia.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Dimensions. Beam.	Dimensions. Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Fuel Capacity.
BALTIC.													
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Kondratenko, Okhotnik, Pogranitschnik, Siberskij-Strelok ..	Abo and Helsingfors	1905	250·3	27·0	8·9	2	625	7,300	25–26	2 12-pdrs. 6 6-pdrs.	3	100	191
Amuretz, Gaidamak, Ussurietz, Vsadnik .	Kiel (Germany)	1905 1906	232·9	23·7	7·9	2	560	6,500	25–26	2 12-prs. 6 6-prs.	3	98	180
Emir Bukharsky, Dobrovoletz Finn, Moskvityanin	Helsingfors	1905	238	27·0	8·6	2	580	6,500	25–26	2 12-pdrs. 6 6-pdrs.	3	98	134
Donskoi - Kasak, Kasanetz, Sabaikaletz, Steregushtshi, Strashny, Trukhmenetz - Stavropolski, Ukraina, Voiskovoi	Riga	1904 1906	239·9	23·7	7·6	2	508	6,200 7,020	25–27	2 12-pdrs. 4 6-pdrs.	2	90	50 120
Prytki	Poplar	1895	190	18·6	7·0	2	240	4,400	29.7	1 12-pr, 3 3-pr	2	..	..
Revy, Retivy, Ryany, Rezviyi, Prosorlivy, Ridny, Poslushny, Protchny, Poratsuchtchi, Podvitsny ..	Abo, Ishora & Nevsky ..	1898	196·9	18·4	11·5	2	240	3,800	27	1 12-pr, 3 3-pr	2	55	53
Bravi, Vidny, Bodry	Nevsky and Ishora ..	1900–2	196 9	18·4	11·5	2	350	6,000	27	1 12-pr, 5 3-pr	3	62	80
Grozni, Grosiashtchi	St. Petersburg	1904	196·9	18·4	11·5	2	350	6,000	27	1 12-pr, 5 3-pr	3	62	80
Tverdy, Totschny, Trevozhny	Abo	1905	196·9	18·4	11·5	2	210	6,000	27	1 12-pr, 5 3-pr	3	62	80
Iskousny, Ispolnitelni, Kriepky, Legky	La Seyne ..	1905	185·9	21·0	7·5	2	324	5,600	26	1 12-pr, 5 3-pr 2 M	2	60	30 100
Lovki, Letutshi, Lichoi	Havre (Normand)	1905	185·8	21·0	7·5	2	324	5,600	27·5	1 12-pr, 5 3-pr 2 M	2	60	30 100
Boievoi, Bditelny, Burni, Vnimatelni, Vnushitelni, Vynoslivny, Sergieff, Yurasovsky, Sviereff, Dmitrieff	Elbing Schichau	1905–6	208·9	23·0		2	365	6,500	28		3		95
Silni, Storoshevoi, Stroiny, Rasyashtshy, Rastoropny, Burakoff, Dyelni, Dostoiny, Deyatelni, Myetky, Molodetsky, Moshtshny, Malieleff, Anastosoff	St. Petersburg and Ochta	1905 1907	185·9	21·0	7·5	2	335-56	5,600	26	1 12-pr, 5 3-pr 2 M	2	60	30 100
Novik	Stettin (Vulcan)	1911	336·6	31·3	8·7	..	1200	36,000	37·3	4 4-in., 2 M.	4 dbl.	..	..
Leit. Ilin, Kapt. Konon Zotov, Kapt. Kingsbergen, Kapt. Kroun, Kapt. Belli, Kapt. Izuilmetev, Kapt. Kern, Leit. Dubasov	St Petersburg (Putiloff)	Bldg.	..	..	..	..	1200– 1300	30,000	36	3 4-in, 4 M.	5 dbl.	..	..

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Russia—*continued.*

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Fuel Capacity.
BALTIC.													
DESTROYERS—*contd.*			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Orphei, Grom, Zabiaka, Pobieditel, Letun, Desna, Samson, Azard .. .. / Gavrul, Mikhail, Vladimir, Konstantin, Sokol, Leit, Lombard .. .. / Gromonosetz, Avtroil, Bryachislav, Fiodor - Stratilat, Pryamislav .. .. / Hogland, Grenhamn, Stirsuden, Patras, Khios, Tenedos, Ruimnik, Smolensk, Kulm	St. Petersburg (Metal Works) / Reval (Parviainin Works) / Reval Shipbldg. Works / Riga (Ziese Yard)	Bldg	..	..	..	..	1200–1300	30,000	36	3 4-in., 4 M.	5 dbl.	..	..
SUBMARINES—													
Delfin	St. Petersburg	1903	65	12	..	..	115–150	..	6	..	3	..	..
Graf Sheremetieff, Kassatka, Nalim, Skat	St. Petersburg	1904	65	12	..	..	150–200	100–60	8–6	..	4	..	..
Som, Shtshuka ..	St. Petersburg	1904	65	12	..	..	120	160	9·5–7	..	2	..	..
Assiotr, Kefal.. ..	St. Petersburg	1905	70	13	..	..	135–175	400	10–7	..	3	..	..
Bialuga, Pescar, Sterliad	St. Petersburg	1904	66	13	..	..	120	160	9–7	..	2	..	..
Sig	St. Petersburg	1904	66	13	..	..	135–175	..	10–7	..	3	..	..
Makrel, Okun.. .. Potschovy	St. Petersburg	1907 / 1908	110	..	..	..	150–200	100–60	8–6	..	6	..	..
Alligator, Drakon, Kaiman, Krokodil..	St. Petersburg	1908	132	14·2	..	..	450–500	..	12–10	..	2	..	..
Akula	St. Petersburg	1908	183·9	..	..	..	370	..	13	..	4	..	..
Minoga	St. Petersburg	1908	117	..	..	..	126	..	..	..	2	..	..
BLACK SEA.													
DESTROYERS—													
Baranoff, Shestakoff, Saken, Sazarenny	Nicolaieff ..	1907–8	241·6	27·0	7·9	2	614	6,500	25	6 12-pdrs.	3	90	200
Zavidni, Zavetni, Zharki, Zhutki, Zhivoi, Zhivulka, Zhivutshtshy ..	Nicolaieff ..	1903-4	210	21·2	7	2	350	5,500	27	1 12-pr, 5 3-pr	2	..	..
Stremitelini, Strogi, Smetlivy, Svirepy	Abo	1901	190·4	18·5	11·5	2	240	3,800	27	1 12-pr, 3 3-pr	2	..	60
Pushkin, Zorki, Zvouki	Nicolaieff ..	1903	210	21·2	7	2	350	5,500	27	1 12-pr, 5 3-pr	2	..	..
Bespokoiny .. .. Bystry, Dersky, Gnievny, Gromky Pospieschny, Pronsitelny, Pilky, Stshastlivy	Nicolaieff .. Nevsky, Putiloff, &c.	1912 and Bldg.	..	..	..	..	1,050	25,000	31	3 4-in., 2 M.	5 dbl.	93	..
SUBMARINES—													
Lossos, Shudok .	Nikolaieff ..	1907	66	13	..	..	120	..	9–7	..	2	..	..
Karp, Karas	Germania ..	1907	130	..	..	..	200–240	600	12–10	..	1	..	..
Morsh, Nerpa, Tiulen	Nikolaieff ..	1913	165·6	17·6	..	..	460–600	1200–800	15–11·5	..	9	..	..
Kashalot Kit, Narval	St. Petersburg	Bldg.	..	..	..	..	..	..	..	..	..	..	..
Krab (mine-layer)..	Nicolaieff ..	1912	171	..	..	..	500–700	..	..	..	2	..	..
FAR EAST.													
DESTROYERS—													
Bespochtchadni, Bestrachni, Boschumni (3 boats)	Elbing ..	1899	196·9	18·4	11·5	1	350	6,000	27	1 12-pr, 5 3-pr	2	..	..
Grozovoi, Vlastni ..	Havre (F. & C.)	1900–2	186·0	20·8	10·3	2	300	5,000	28	1 12-pr, 5 3-pr	2	..	80
Boiki	Nevsky ..	1900	196·9	18·4	11·5	1	350	6,000	28	1 12-pr, 5 3-pr			

Twelve submarines are in hand for the Baltic—8 at Messrs. Nobel & Lessner's, and 4 at the Baltic Yard—600 tons, 2000 h.p., named as follows: Lvitza, Kuguar, Leopard, Pantera, Ruis, Tigr, Tur, Yaguar, Bars, Vepr, Volk and Gepard. Six others to be built at the Nevsky yard for the Far East.

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Spain.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Fuel Capacity.
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Destroyers—													
Terror .. .. .. Audaz	Clydebank ..	1896	220	22	5·6	2	300	6,000	28	2 12-pr. 2 6-pr. 2 1-pr.	2	67	100
Osado .. .. .. Proserpina	Clydebank ..	1897	225	25·6	5·8	2	400	7,500	30	2 14-pr. 2 6-pr. 2 1-pr.	2	70	90
Bustamente .. .. Villamil .. .. .. Cadarso	Cartagena .. Cartagena .. Cartagena ..	Bldg.	220	22	7·5	..	370	6,250*	28	5 6-pr.	2	..	..
First Class—													
24 boats	Cartagena ..	Bldg. Pro.	165	16·6	..	..	180	3,750*	26	3 3-pr.	3	..	..
Azor	Poplar.. ..	1887	134·5	14	6	1	108	1,600	24	4 3-pr.	3	23	25
Halcón	Poplar.. ..	1887	134·5	14	..	1	108	1,600	24	4 3-pr.	3	23	25

Azor and Halcón re-boilered by Yarrow (water-tube). * Turbines and Normand type boilers.

Sweden.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Fuel Capacity.
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Destroyers—													
Mode	Yarrow ..	1902	220·3	20 6	8·9	2	400	6,800	32·4	1 12-pr. 5 6-prs.	2	55	95
Magne .. .. .. Wale.. .. .. .. Ragnar .. .. .. Sigurd .. .. .. Vidar .. .. .. Hugin .. .. .. Munin	Thornycroft Malmo .. Malmo .. Gothenburg Malmo .. Gothenburg Malmo ..	1905 1906 1909 1909 1909 1909 1910	216·9	20·8	8·2	2	430	7,200	30·0	2 12-prs. 4 6-prs.	2	63	90
First Class—													
Komet	Elbing ..	1896	128	15·9	6·11	1	92	1,056	23·0	2 1·9-in. Q.F.	2	16	17
Blixt..	Carlskrona..	1898	128	15·9	6·11	1	92	1,260	23·5	2 1·9 in Q.F.	2	18	17
Meteor	Carlskrona..	1899	128	15·9	6·11	1	92	1,330	23·8	2 1·9-in. Q.F	2	18	17
Stjerna	Carlskrona..	1899	128	15·9	6·11	1	92	1,250	23·4	2 1·9-in. Q.F.	2	18	17
Orkan	Carlskrona..	1900	128	15·9	6·11	1	92	1,250	23·5	2 1·5-in. Q.F.	2	18	17
Vind	Carlskrona..	1900	128	15 9	6·11	1	92	1,250	23·5	2 1·5-in. Q.F.	2	18	17
Bris	Carlskrona..	1900	128	15·9	6·11	1	92	1,250	23 5	2 1·5-in. Q.F.	2	18	17
Virgo	Carlskrona..	1902	128	15·9	6·11	1	92	1,250	23·5	2 1·5-in. Q F.	2	18	17
Mira	Carlskrona..	1902	128	15·9	6·11	1	92	1,250	23·5	2 1·5-in. Q.F.	2	18	17
Orion .. .. .. Sirius .. .. .. Kapella	Carlskrona..	1903	128	15·9	6·11	1	92	1,250	23 5	2 1·5-in. Q.F.	2	18	17
Pleiad, Castor, Pollux	Normand ..	1909	125	15	6·6	1	96	1,900	26	2 1·5-in. Q.F.	2	18	20
Vega .. .. Vesta	Carlskrona..	1910	125	17·5	8·6	1	105	1,900	25	1 6-pr. 1 1·4-in.	2	18	20
Spica, Astrea, Iris, Thetis	Bergsund and Gothenburg	1910	125	17·5	8·6	1	105	1,900	25	1 6-pr. 1 1·4-in.	2	18	20
Altair .. .. .. Antares .. .. .. Argo .. .. .. Arcturus	Stockholm ..	1908	128	17·5	8·6	..	110	2,000	25	2 6-prs.	2	18	20
Perseus, Polaris .. Regulus, Rigel .. A, B, C, D	Bergsund .. Stockholm .. Carlskrona & Gothenburg	1912 Bldg.	128	17·5	8 6	1	110	2,000	25	12 6-pr.	2	18	20
Submarines—													
Enroth	Stockholm ..	1902	82·0	13·0	11·6	2	146	100	12-11	..	1	..	..
Hajen	Stockholm ..	1904	65·0	11·6	..	..	120	200	10-7	..	..	..	..
Hvalen	Muggiano ..	1908	139·6	14·2	6·9	..	185–235	750	15–7½	..	2	15	..
Nos. 2, 3, 4	Stockholm ..	1911	136·6	14·2	6 9	..	185–235	750	15–7½	..	2	15	...

Also six small torpedo-boats, 49 tons, built 1892–1903. Five additional submarines are in hand, two at Malmo (F.I.A.T. type)—one by the Bergsund firm—and three at Stockholm.

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Turkey.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes	Complement.	Fuel Capacity.
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Berk-Efshan	Kiel	1894	187	21·6	..	2	270	1,200	25	6 1-pr. revs.	2	...	...
Taljar	Kiel	1894	187	21.6	..	2	270	..	25	6 1-pr. revs.	2	...	...
Samsoun .. .. .. / Basra.. .. .. .. / Tassos .. .. .. / Yar-Hissar	Bordeaux ..	1907-8	184·9	19·6	9·6	2	280	..	28	1 9-pr. / 6 3-pr.	2	..	26
Jadighiar-i-Millet .. / Muavenet-i-Millet, .. / Mahabet-i-Watan .. / Nuhum-i-Hamijet ..	Elbing (Schichau)	190[illegible]	236·6	25·6	12·3	2	610	14,000	35	2 3·4 in. 2 M.	3	..	160
FIRST CLASS—													
Ac-Hisar	Sestri Ponente	1904	165·8	18·6	4·5	..	165	2,200	27				
Urffa, Tokat, Deradj, Kulabia, Mossul..	Sestri Ponente	1906	165·8	18·6	4·5	..	165	2,200	24				
A. B...	Sestri Ponente	1901	166	18·6	4·0	2	145	2,400	26	2·1 pr.	2	..	16

Several destroyers and submarines are intended to be purchased or built.

United States.

Name or Number	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement	Indicated Horse-Power.	Maximum Trial Speed.	Armament. Guns.	Torpedo Tubes.	Complement.	Maximum Fuel Capacity
DESTROYERS—			ft. in.	ft. in.	ft. in.		Tons.		Knots				Tons.
Smith	Philadelphia	1909	289 0	26 0	8 0	3	700	10,362*	29·5 t.			89	285
Lamson	Philadelphia	1909	289 0	26 0	8 0	3	700	10,000*	29·5			89	285
Preston	Camden, N.J.	1909	289 0	26 0	8 0	3	700	10,000*	28			89	270
Flusser	Bath, Me. ..	1909	289 0	26 0	8 0	3	700	11,842*	30·41 t.			89	295
Reid	Bath, Me. ..	1909	289 0	26 0	8 0	3	700	12,7[illegible]4*	31·82 t.			89	295
Paulding	Bath, Me. ..	1910	289 0	26 1¼	8 4	3	742	12,000*	29·50			89	210
Drayton	Bath, Me. ..	1910	289 0	26 1¼	8 4	3	742	12,000*	29·50			89	210
Roe	Newport News, Va.	1909	289 0	26 1¼	8 4	3	742	12,000*	29·50			89	210
Terry		1909	289 0	26 1¼	8 4	3	742	12,000*	29·50			89	210
Perkins	Quincy, Mass	1910	289 0	26 1¼	8 4	2	742	12,000†	29·50			89	216
Sterrett	Quincy, Mass.	1910	289 0	26 1¼	8 4	2	742	12,000†	29·50	5 3-in., 2 M.	3 18-in.	89	216
McCall	Camden, N.J.	1910	289 0	26 1¼	8 4	3	742	12,000*	33·0			89	210
Burrows	Camden, N.J.	1910	289 0	26 1¼	8 4	3	742	12,000*	29·50			89	210
Warrington ..	Philadelphia	1910	289 0	26 1¼	8 4	2	742	12,000‡	30			89	210
Mayrant	Philadelphia	1910	289 0	26 1¼	8 4	2	742	12,000‡	29·50			89	210
Monaghan ..	Newport News	1911	289 0	26 1¼	8 4	3	900	12,000*	30			89	210
Trippe	Bath, Me. ..	1911	289 0	26 1¼	8 4	3	900	12,000*	29·50			89	210
Walke	Quincy, Mass.	1911	289 0	26 1¼	8 4	2	900	12,000†	29·50			89	216
Ammen	Camden, N.J.	1911	289 0	26 1¼	8 4	3	900	12,000*	29·50			89	210
Patterson	Philadelphia	1910	289 0	26 1¼	8 4	3	900	12,000*	3[illegible]			89	210
Bainbridge ..	Philadelphia	1901	245 0	23 7	6 6	2	420	8,000	28·45	2 14-pr., 5 6-pr..	2	64	139
Barry	Philadelphia	1902	245 0	23 7	6 6	2	420	8,000	28·13	2 14-pr., 5 6-pr.	2	64	139
Chauncey.. ..	Philadelphia	1901	245 0	23 7	6 6	2	420	8,000	2[illegible]·64	2 14-pr., 5 6-pr.	2	64	139
Dale	Richmond ..	1900	245 0	23 7	6 6	2	420	8,000	28	2 14-pr., 5 6-pr.	2	64	139
Decatur	Richmond ..	1900	245 0	23 7	6 6	2	420	8,000	28·10	2 14-pr., 5 6-pr.	2	64	139
Hopkins	Wilmington	1902	244 0	24 6	6 0	2	408	8,456	29·02	2 14-pr., 5 6-pr.	2	64	150
Hull	Wilmington	1902	244 0	24 6	6 0	2	408	9,119	28·04	2 14-pr., 5 6-pr.	2	64	150
Lawrence.. ..	Quincy, Mass.	1900	242 3	22 3	6 2	2	400	8,400	28·41	2 14-pr., 5 6-pr.	2	64	115
Macdonough ..	Quincy, Mass.	1901	242 3	22 3	6 2	2	400	8,400	28·03	2 14-pr., 5 6-pr.	2	64	115
Paul Jones ..	San Francisco	1900	245 0	23 7	6 6	2	420	8,000	28·91	2 14-pr., 5 6-pr.	2	64	139
Perry	San Francisco	1900	245 0	23 7	6 6	2	420	7,950	28·[illegible]2	2 14-pr., 5 6-pr	2	64	139
Preble	San Francisco	1901	245 0	23 7	6 6	2	420	7,370	28·03	2 14-pr., 5 6-pr.	2	64	139
Stewart	Morris Heights	1902	245 0	23 7	6 6	2	420	8,000	29·69	2 14-pr., 5 6-pr.	2	64	139
Truxtun	Baltimore ..	1901	248 0	23 3	6 0	2	433	8,300	29·58	2 14-pr., 5 6-pr.	2	64	232
Whipple	Baltimore ..	1901	248 0	23 3	6 0	2	433	8,300	28·24	2 14-pr., 5 6-pr	2	64	232
Worden	Baltimore ..	1901	248 0	23 3	6 0	2	433	8,300	29·56	2 14-pr., 5 6-pr.	2	64	232

* Parsons turbines. † Curtis turbines. ‡ Zoelly turbines.

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United States—*continued.*

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament. Guns.	Torpedo Tubes.	Complement.	Maximum Fuel Capacity.
DESTROYERS—*continued.*			ft. in.	ft. in.	ft. in.		Tons.		Knots.				Tons.
Beale													
Fanning													
Henley	Quincy, Mass.	1911	289 0	26 1½	8 4	3	900	12,000*	30·3	5 3-in., 2 M.	3 18-in.	89	210
Jarvis													
Jouett													
Aylwin	Philadelphia	1912											
Balch	Philadelphia	1912											
Benham	Philadelphia	1913	300 0	30 6	9 3	2	1010	16,000	29½	4 4-in., 2 M.	3	98	300
Cassin	Philadelphia	1913											
Cummings ..	Bath	1913											
Downes	Bath	1914											
Duncan	New York ..	1913	300 0	30 6	9 3	2	1010	16,000	29·8	4 4-in., 2 M.	3	98	300
Parker	Quincy, Mass.	1913							30·3				
SEA-GOING—													
Bagley	Bath	1900	157 0	17 0	4 7	2	167	4,200	29·15	3 3-pr.	3	29	..
Bailey	Morris Heights	1899	205 0	19 0	6 0	2	235	5,600	30·20	4 6-pr.	2	..	20
Barney	Bath	1900	157 0	17 0	4 7	2	167	4,200	29·04	3 3-pr.	3	29	..
Biddle	Bath	1900	157 0	17 0	4 7	2	167	4,200	28·57	3 3-pr.	3	29	..
Blakely	Boston ..	1902	175 0	17 6	4 8	2	165	3,000	25·58	3 3-pr.	3	29	70
De Long	Boston ..	1901	175 0	17 6	4 8	2	165	3,000	25·52	3 3-pr.	3	29	70
Du Pont	Bristol, R.I.	1897	175 0	17 8	4 8	2	165	..	28·58	4 1-pr.	3	32	76
Rowan	Seattle, Wash.	1898	170 0	17 0	5 11	2	182	3,200	27·07	4 1-pr.	3	32	60
Shubrick	Richmond ..	1899	175 0	17 6	4 8	2	165	3,375	26·07	3 3-pr.	3	29	70
Stockton	Richmond ..	1899	175 0	17 6	4 8	2	165	3,275	25·79	3 3-pr	3	29	70
Tingey	Baltimore ..	1902	175 0	17 6	4 8	2	165	3,000	24·94	3 3-pr.	3	29	70
Wilkes	Morris Heights	1901	175 0	17 6	4 8	2	165	3,495	25·99	3 3-pr.	3	29	70
Winslow	Baltimore ..	1897	160 0	16 1	5 0	2	142	2,000	24·82	3 1-pr	3	24	44
Cushing	Bristol, R.I.	1890	138 9	14 3	4 11	2	105	1,720	22·50	3 1-pr.	3	23	36
Dahlgren	Bath	1899	147 0	16 4	4 7	2	146	4,200	30	4 1-pr.	2	..	32
Davis	Portland, Ore.	1898	146 0	15 4	5 4	2	132	1,750	23·41	3 1-pr.	3	..	..
Farragut	San Francisco	1898	213 6	20 8	6 0	2	273	5,878	30·13	4 6-pr.	2	..	76
Fox	Portland, Ore.	1898	146 0	15 4	5 4	2	132	1,750	23·13	3 1-pr.	3	..	..
Goldsborough ..	Portland, Ore.	1902	194 8	20 5	5 0	2	247·5	6,000	27·40	4 6-pr.	2	..	131
Morris	Bristol, R.I.	1898	138 3	15 6	4 1	2	105	1,750	24	3 1-pr.	3	..	28
Somers	Schichau, Elbing ..	1898	149 3½	17 5	..	2	145	1,900	17·5	..	..	..	..
Stringham ..	Wilmington	1899	225 0	22 0	6 6	2	340	7,200	25·33	7 6-pr.	2	..	120
T. A. M. Craven	Bath	1899	147 0	16 4	4 7	2	146	4,200	30	4 1-pr.	2	..	32
Thornton	Richmond	1900	175 0	17 6	4 8	2	165	3,000	24·88	3 3-pr.	3	29	70
THIRD CLASS—													
Gwin	Bristol, R.I.	1897	99 6	12 6	3 3	1	46	850	20·88	1 1-pr.	2	..	8
Mackenzie ..	Philadelphia	1898	99 3	12 9	4 3	1	65	850	20	1 1-pr.	2	..	15·
McKee	Philadelphia	1898	99 3	12 9	4 3	1	65	850	19·82	2 1-pr.	2	..	..
Talbot	Bristol, R.I.	1897	99 6	12 6	3 3	1	46	850	21·15	1 1-pr.	2	..	8·8
SUBMARINE—													
A1, A2	Elizabethport	1902	63 4	11 9	..	1	120	160	7—8	..	1	7	..
A3	San Francisco	1902	63 4	11 9	..	1	120	160	7—8	..	1	7	..
A4	Elizabethport	1901	63 4	11 9	..	1	120	160	7—8	..	1	7	..
A5	San Francisco	1902	63 4	11 9	..	1	120	160	7—8	..	1	7	..
A6, A7	Elizabethport	1901	63 4	11 9	..	1	120	160	7—8	..	1	7	..
B1-B3	Quincy, Mass.	1909	80 6	13 0	..	..	170	250	8½—10	..	..	19	..
C1-C5	Quincy, Mass.	1906-9	106 0	..	..	..	273	..	..	..	..	..	..
D1-D3	Quincy, Mass.	1909	..	..	..	..	278-340	500	..	..	2-3	10	..
E1, E2	Quincy, Mass.												
F1, F2	San Francisco												
F3, F4	Seattle ..	Bldg.	160·0	13 0	..	2	325-40[illegible]	800	9½—14	..	4-6	18	..
G1-G3	Newport News	1912											
G4	Philadelphia												
H1, 2, 3† ..	Quincy, Mass.	Bldg.											
K5, 6, 7, 8 ..	Quincy, &c. ..	Bldg.	165·0	15 6	..	2	500	2000	11-14	..	..	18	..
L 1-L7	Newport News	Bldg.	..	..	..	..	775	..	..	..	6	..	..
M 1-M 5	Quincy, Mass.	Bldg.	..	..	..	..	740	..	..	..	6	..	..

Destroyers O'Brien, Nicholson, Winslow, McDougal, Cushing, Ericsson provided for 1912; 1050 tons, 17,000 H.P., four 4-in. guns and four double tubes. Six ordered in 1913. Three additional submarines ordered, 1913, and six provided for 1914.

* Parsons turbines. † Sub-surface destroyers.

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BRITISH AND FOREIGN AIRSHIPS.

Great Britain.

Name.	Make.	Date.	Displacement. tons	Length. ft.	Diameter. ft.	Motors.	Total H.P.	Fuel endurance at Full Speed.	Speed, knots.	Speed, m.p.h.	Remarks.
						BATTLE AIRSHIP.					
No. 9 (?) ..	Vickers ..	1914	23	520	49	4 Maybach ..	720	24	44	50	Building. Experimental.
						MINE-LAYING AND SCOUTING AIRSHIPS.					
No. 12 (?) ..	Armstrong	1914	15	?	?	4	320	?	40·8	46	Building, Forlanini design.
No. 11 (?) ..	,,	1914	15	?	?	4	320	?	40·8	46	,, ,, ,,
No. 10 (?) ..	,,	1914	15	?	?	4	320	?	40·8	46	,, ,, ,,
No. 8 (?) ..	Astra	1914	12	?	?	2 Chenu.. ..	500	20	44	50	Building, Torres design.
No. 7 ..	Vickers ..	1914	10	280	49·5	2 Maybach ..	360	20	41·4	47	Building, Parseval design.
No. 6 ..	,, ..	1914	10	280	49·5	2 ,, ..	360	20	41·4	47	,, ,, ,,
No. 5 ..	,, ..	1914	10	280	49·5	2 ,, ..	360	20	41·4	47	,, ,, ,,
No. 4 ..	,, ..	1913	10	270	50	2 ,, ..	360	20	37	42	Parseval design.
No. 3 ..	Astra ..	1913	8	260	50	2 Chenu.. ..	400	10	44·9	51·1	Torres design.
No. 2 ..	Willows ..	1912	1	100	26	1 Renault ..	40	10	30·8	35	
Eta	R.A.F. ..	1913	3·5	160	34	2 Canton-Anne	180	12	39·6	45	Reconstructed. Training purposes only.
Delta	R.A.F. ..	1912	5·3	180	43	2 White and Poppe.. ..	180	10	38·7	44	
Gamma ..	R.A.F. ..	1910	3·4	152	35	2 de Haviland	60	16	25·8	27	Training purposes only.
Beta	R.A.F. ..	1909	1·2	104	27	1 Clerget ..	50	8	32·5	37	Reconstructed. Training purposes only.

Efficient aeroplanes and seaplanes about 250.

Germany.

Name.	Make.	Date.	Displacement. tons.	Length. ft.	Diameter. ft.	Motors.	Total H.P.	Fuel endurance at Full Speed.	Speed, knots.	Speed, m.p.h.	Remarks.
						BATTLE AIRSHIPS.					
L 5 (?)	Zeppelin ..	1914	32	550	61	6 Maybach (?)	1080	30	44	50	(?) Building for Navy. Possibly 4 Daimler engines of 240 each.
L 3..	,, ..	1914	32	550	61	4 Maybach ..	720	30	40	50	Navy.
Z 8..	,, ..	1914	22	515	49	3 ,, ..	540	20	42·4	48	Army.
Z 7..	,, ..	1913	22	515	49	3 ,, ..	540	20	42·4	48	Army.
Z 6..	,, ..	1913	19·5	465	49	3 ,, ..	540	12	42·4	48	Army.
Z 5..	,, ..	1913	19·5	465	49	3 ,, ..	540	12	42·4	48	Army.
Z 4..	,, ..	1913	19·5	465	49	3 ,, ..	540	12	42·4	48	Army.
Z 1..	,, ..	1913	19·5	465	49	3 ,, ..	540	12	42·4	48	Army, replaced original Z 1, built 1906.
Z 3..	,, ..	1912	17·5	462	46	3 ,, ..	450	10	42·8	48·4	Army.
Z 2..	,, ..	1911	17·8	485	46	3 ,, ..	450	10	41·6	47·2	Army.
L 4..	,, ..	1914	30	550	61	4 Daimler ..	960	?	?	?	Building for Navy.
SL 2	Schutte-Lanz	1914	23	475	61	4 Maybach ..	720	20	44	50	Army.
?	Parseval ..	1914	27	550	50	4 ,, ..	720	48	43·2	49	Experimental.
Sachsen ..	Zeppelin ..	1913	19·5	465	49	3 ,, ..	540	12	42·4	48	Privately owned; hired by Navy.
Hansa	,, ..	1912	18·7	485	46	3 ,, ..	540	10	43·7	49·7	Privately owned; subsidised by Army.
Victoria Luise	,, ..	1912	18·7	485	46	3 ,, ..	450	10	42·4	48	Privately owned; subsidised by Army.
						MINE-LAYING AND SCOUTING AIRSHIPS.					
?	Parseval .	1914	11	?	?	?	?	?	?	?	Building for Navy
P 4	,, ..	1914	10	280	50	2 Maybach ..	360	20	41·4	47	Army.
P 3	,, ..	1911	10	280	52	2 Korting ..	400	12	35·2	40	Army.
P 2 Ersatz ..	,, ..	1910	8	254	49	2 Maybach ..	360	8	28	32	Army.
M 4	Gross	1913	13	320	44·5	3 Korting ..	450	?	41·4	47	Army.
M 1	,, ..	1912	6	245	36·3	2 ,, ..	150	?	24·7	28	Army.

And a few private ships of little or no military value. Aeroplanes and seaplanes about 500.

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Austria-Hungary.

Name.	Make.	Date.	Displacement.	Length.	Diameter.	Motors.	Total H.P.	Fuel endurance at Full Speed.	Speed, knots.	Speed, m.p.h.	Remarks.
			tons	ft.	ft.						
BATTLE AIRSHIPS.											
6 Zeppelins projected	..	..	..	..	..	..	..	..	..	..	Doubtful if these will be completed, for financial reasons.
MINE-LAYING AND SCOUTING AIRSHIPS.											
M 3	Körting ..	1910	3·6	213	35	2 Körting ..	150	..	..	30	Army.
M 2	Lebaudy ..	1910	..	230	33	1 Daimler ..	100	..	..	23	Army.
M 1	..	1909	..	164	28	1 Daimler ..	70	..	..	27	Army.

2 privately owned.

Italy.

Name.	Make.	Date.	Displacement.	Length.	Diam.	Motors.	Total H.P.	Fuel endurance at Full Speed.	Speed, knots.	Speed, m.p.h.	Remarks.
			tons.	ft.	ft.						
BATTLE AIRSHIPS.											
3 of 32 tons projected.											
MINE-LAYING AND SCOUTING AIRSHIPS.											
M 4	..	1914	12	275	56	3 Maybach ..	540	20	38·7	44	Navy.
M 3	..	1913	12	275	56	3 Maybach ..	540	20	38·7	44	Navy.
M 2	..	1912	12	275	56	4 Wolseley ..	600	20	38·7	44	Army.
M 1	..	1912	12	275	56	2 F.I.A.T. ..	500	20	38·7	44	Navy.
..	Parseval ..	1914	10	280	49·5	3 Maybach ..	540	20	41·4	47	Building. Army.
..	,, ..	1912	9·6	270	50	2 Maybach ..	360	15	37	42	
..	Forlanini ..	1914	15	..	..	4 Itala	320	..	..	..	Ordered.
P 5	..	1913	4·7	205	40	2 F.I.A.T. ..	160	8	32·5	37	Served in Tripoli.
P 4	..	1912	4·7	205	40	2 F.I.A.T. ..	160	8	32·5	37	Served in Tripoli.
P 3	..	1911	4·4	205	38	1 Clément-Bayard	120	8	28	32	
P 2	..	1910	4·4	205	38	1 Clément-Bayard	120	8	28	32	
P 1	..	1907	4·2	198	38	1 Clément-Bayard	120	8	28	32	

And 3 small private ships. Efficient aeroplanes and seaplanes, 150.

Japan.

Name.	Make.	Date.	Displacement.	Length.	Diameter.	Motors.	Total H.P.	Fuel endurance at Full Speed.	Speed, knots.	Speed, m.p.h.	Remarks.
			tons	ft.	ft.						
BATTLE AIRSHIPS.											
Nil.											
MINE-LAYING AND SCOUTING AIRSHIPS.											
..	Parseval ..	1912	8·5	260	50	2 Maybach ..	300	10	37	42	
..	Yamada ..	1910	7	100	35	1 Maxi ..	50	..	..	..	

Spain.

MINE-LAYING AND SCOUTING AIRSHIP.

España	Astra	1910	4·2	..	..	1 Panhard ..	120	..	18·5	21

Turkey.

MINE-LAYING AND SCOUTING AIRSHIP.

..	Parseval ..	1910	2·2	129	20	1 N.A.G. ..	50	8	22	25

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France.

Name.	Make.	Date.	Displacement.	Length.	Diameter.	Motors.	Total H.P.	Fuel endurance at Full Speed.	Speed, knots.	Speed, m.p.h.	Remarks.
			tons	ft.	ft.						
						BATTLE AIRSHIPS.					
?	Astra	1914	38	?	?	Chenu	2000?	24	61·6	70	Building.
Speiss	Zodiac	1912	20	?	47	2 Chenu.. ..	400	?	?	?	Has been lengthened: now flying successfully.
						MINE-LAYING AND SCOUTING AIRSHIPS.					
	Astra	1914	23	394	52	4 Chenu.. ..	1000	24	52·8	60	Completing.
?	,, ...	1914	23	394	52	4 ,, ...	1000	24	52·8	60	Ordered.
?	Clément-Bayard ..	1914	22	..	..	4 Clément-Bayard ..	1000	24	44	50	Completing.
?	,, ..	1914	22	..	..	,,	1000	24	44	50	Ordered.
?	Lebaudy ..	1914	17	..	..	Panhard ..	1000	24	44	50	Completing.
?	Zodiac	1914	20	..	..	2 Chenu.. ..	1000	24	44	50	Completing.
?	,, ...	1914	20	..	..	2 Dansette-Gillet ..	1200	..	..	..	Ordered.
Conté	Astra	1913	9·1	270	49	2 Chenu.. ..	400	12	35·2	40	
St. Chauré ..	,, ...	1911	9	285	49	3 Panhard ..	330	10	28·1	32	
Adj. Réau ..	,, ...	1911	9	285	49	2 Brasier ..	240	12	28·1	32	
Dupuy de Lôme	Clément-Bayard ..	1912	9	290	55	2 Clément-Bayard ..	260	12	30·8	35	
Adj. Vincenot	,, ..	1911	9	290	55	,, ..	..	12	30·8	35	
?	Lebaudy ..	1914	10	..	..	Panhard ..	..	..	..	..	Building.
Capt. Marchal	,, ...	1911	10	293	51	2 Panhard ..	160	12	24·6	28	
Lt. Selle de Beauchamp	,, ...	1910	10	293	51	2 ,, ..	160	12	24·6	28	
Liberté	,, ...	1910	7	280	45	2 ,, ..	160	8	29	33	
?	Zodiac	1914	10	..	..	..	..	..	..	..	Building.
?	,, ...	1914	10	..	..	..	..	..	..	..	Building.
Capt. Ferber..	,, ...	1911	6	249	43	2 Dansette-Gillet ..	220	8	30·8	35	
Commandant Coutelle ..	,, ...	1911	9·5	303	49	,,	400	12	33·4	38	
Fleurus	Government Factory ..	1912	6·5	252	41	2 Clément-Bayard ..	160	12	31	36	

And several old and small ships of little value; also about 500 aeroplanes and seaplanes.

Russia.

Name.	Make.	Date.	Displacement.	Length.	Diam.	Motors.	Total H.P.	Fuel endurance at Full Speed.	Speed, knots.	Speed, m.p.h.	Remarks.
			tons	ft.	ft.						
						BATTLE AIRSHIPS.					
?	Baltic Works	1913	13	..	..	4	320	..	..	..	Experimental.
?	Parseval ..	1914	27	..	..	..	..	48	43·2	49	Projected.
						MINE-LAYING AND SCOUTING AIRSHIPS.					
?	Astra	1914	23	?	?	4 Chenu.. ..	1000	24	52·8	60	Ordered.
?	Clément-Bayard ..	1914	22	..	..	..	1000	24	..	50	Ordered.
Albatross ..	Ischora Works	..	..	..	..	..	..	..	..	..	Building.
?	Clément-Bayard ..	1914	6·5	..	..	2 Clément-Bayard ..	360	..	..	..	Building.
?	Kostevitch ..	1913	7	265	..	..	..	..	..	..	Building.
?	Astra	1913	9·8	263	52	2 Chenu.. ..	400	12	35·2	40	
?	Parseval ..	1913	9·6	280	55	2 Maybach ..	360	12	37	42	
?	Clément-Bayard ..	1913	9	290	55	2 Clément-Bayard ..	360	12	30	34	

And about 12 small and old ships of little value; also about 500 aeroplanes and seaplanes.

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AIRSHIP SHEDS.

Arranged alphabetically.

England.

Place.	Date.	Length.	Breadth.	Height.	Owner.	Remarks.
Farnborough	1909	350	60	80	Admiralty	To be removed.
Farnborough	1911	350	100	60	Admiralty	To be removed.
Farnborough	1910	250	50	60	Admiralty	Canvas portable.
Kingsnorth (Medway)	1914	600	120	80	Admiralty	Building.
Kingsnorth	1914	600	160	80	Admiralty	Building—imported German shed.
Walney Island	1914	600	160	80	Vickers	Building—imported German. Very exposed situation.
Wormwood Scrubbs	1911	300	80	80	Admiralty	No equipment.

Germany.

Place.	Date.	Length.	Breadth.	Height.	Owner.	Remarks.
Aachen	1914	..	..	..	....	Building.
Allenstein	1914	..	..	..	....	Building.
Bickendorf (Cologne)	1909	505	168	92	Army	
Biesdorf (Berlin)	1909	445	84	84	Siemens-Schucker	
Bitterfeld	1908	257	84	72	Parseval Co.	
Bitterfeld	1909	330	110	84	Parseval Co.	
Brunswick	1914	600	115	92	Private	Building.
Cologne-Nippes	..	132	53	42	F. Cloutt	
Cuxhaven	1914	600	250	100	Navy	Building. Revolving.
Cuxhaven	..	..	..	..	Navy	Revolving.
Dresden	..	634	190	100	State	
Dusseldorf	1910	512	84	80	State	
Frankfort	1911	540	100	80	Delag Co.	
Friedrichshafen	1908	593	130	66	Zeppelin	
Fulhsbüttel (Hamburg)	1911	540	126	87	Private	
Gotha	1910	525	87	87	State	
Graudenz	1914	..	..	..	....	Building.
Hanover	1914	..	..	..	....	Building.
Johannisthal (Berlin)	1910	272	84	84	Private	
Johannisthal (Berlin)	1911	548	126	95	Private	
Kiel	1910	560	100	85	Private	
Konigsberg	1911	560	139	125	Army	
Lahr	1914	..	..	..	....	Building.
Leichlingen	1909	264	78	81	Private	
Leipzig	1913	[illegible]40	198	84	Private	
Liegnitz	1913	..	..	..	Army	
Manzell	1900	460	84	84	Zeppelin	
Metz	1907	495	142	87	Army	
Oos (Baden-Baden)	1910	525	84	80	Delag Co.	
Potsdam	1911	556	165	82	Zeppelin	
Posen	1914	..	..	..	....	Building.
Rheinau (Mannheim)	1907	530	190	100	Schütte-Lanz	
Schneidemühl	1914	..	..	..	....	Building.
Strassburg	1910	495	90	82	Army	
Tegel (Berlin)	1906	265	92	82	Private	
Tegel (Berlin)	1905	165	60	..	Army	
Tegel (Berlin)	1907	221	72	..	Army	
Tegel (Berlin)	1910	333	82	82	Army	
Thorn	1912	..	..	..	Army	
Trier	1914	..	..	..	....	Building.
Wanne	1912	297	105	90	Private	
4 Portable Sheds	..	265	82	82	Army	Can be erected by 150 men in 24 hours. Cannes.

France.

Place.	Date.	Length.	Breadth.	Height.	Owner.	Remarks.
Beauvale	1909	225	..	..	Army	
Belfont	1911	570	100	80	Army	
Châlons	1909	225	..	..	Army	
Châlons	1909	330	..	..	Army	Portable.
Issy-les-Moulineaux	1908	300	..	..	Astra	
Issy-les-Moulineaux	1909	231	..	..	Clément-Bayard	
Lamotte-Breuil	1909	244	72	80	Clément-Bayard	
Mauberge	1913	..	..	..	Army	
Meudon	1906	365	..	..	Army	
Moisson	1900	231	..	..	Army	
Moisson	1905	20[illegible]	..	..	Lebaudy	
Moisson	19 1	430	125	100	Army	
Nancy	1908	197	..	..	Army	
Pau	1910	265	..	..	Astra	
Satrouville	1906	300	..	..	Army	
St. Cyr	1908	165	..	..	Zodiac	
St. Cyr	1911	530	84	8[illegible]	Zodiac	
Verdun	1911	297	..	..	Army	
3 Portables	..	230	..	..	Army	

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Russia.

Place.	Date.	Length.	Breadth.	Height.	Owner.	Remarks.
Berditschew	..	545	158	100	Army	
Brest-Litowsk	..	..	..	..	....	
Dunaburg..	..	..	..	..	....	
Homel	..	..	..	..	....	
Kiev	..	..	..	..	....	
Kovno	..	..	..	..	....	
Lida	..	..	..	..	....	
Luzk	..	330	82	82	....	
Minsk	..	..	..	..	....	
Pleskau	..	..	..	..	....	
Renal	..	..	..	..	....	
St. Petersburg	..	..	..	..	....	
St. Petersburg	..	..	..	..	....	
St. Petersburg	..	..	..	..	....	
Salisi-Gatschina ..	1909	264	60	76	....	
Salisi-Gatschina ..	1911	264	60	85	....	
Vladivostock	1914	548	158	100	....	Reported building 1913.
Vladivostock	1914	548	158	100	....	Reported building 1913.
Vladivostock	1914	548	158	100	....	Reported to be built 1914.
Vladivostock	1914	548	158	100	....	Reported to be built 1914.
Witebsk	..	..	..	..	....	

Italy.

Baggio (Milan)	1911	297	120	80	Army	
Bosco-Mantoes (Verona)	1910	297	74	80	Army	
Campalto	1910	264	60	70	Army	
Campalto	1911	363	90	106	Army	
Ferrara	1912	363	90	106	Army	
Jesi	1914	..	..	..	....	Building.
Vigna di Valle	1912	297	74	93	Army	
Vigna di Valle	1907	231	48	66	....	
Bengasi (Cirenaica) ..	1912	225	90	72	....	
Tripoli	1912	313	106	90	....	
Leros Island	1912	330	106	106	....	

Austria-Hungary.

Fischamend	1909	264	..	..	Army	
Fischamend	1911	198	..	..	Army	
Budapest	1912	231	..	..	Army	

Japan.

Tokoroyawa	1912	430	100	82	Army	
Tokoroyawa	1911	330	82	72	Army	
Makano	1910	264	82	66	Army	
Tokio	1910	264	66	60	Yamada	

Belgium.

Etterbeck (Brussels) ..	1911	300	..	..	....	
Antwerp	..	231	..	..	....	

Turkey.

Constantinople	1913	172	50	60	Army	

Spain.

Madrid	..	..	..	..	....	One small shed.
San Sebastian	..	..	..	..	....	Ditto.

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PLANS

OF

BRITISH AND FOREIGN SHIPS.

SCALE FOR PLATES
100 FEET TO THE INCH

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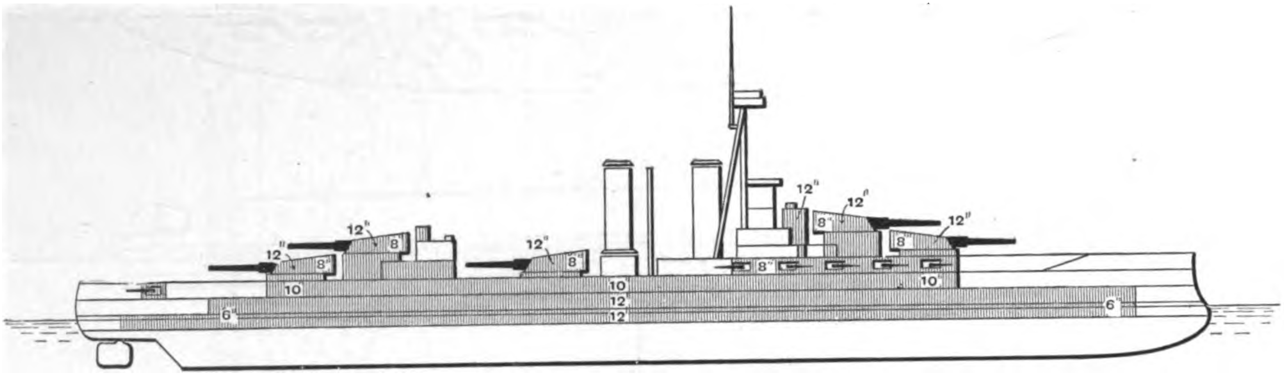
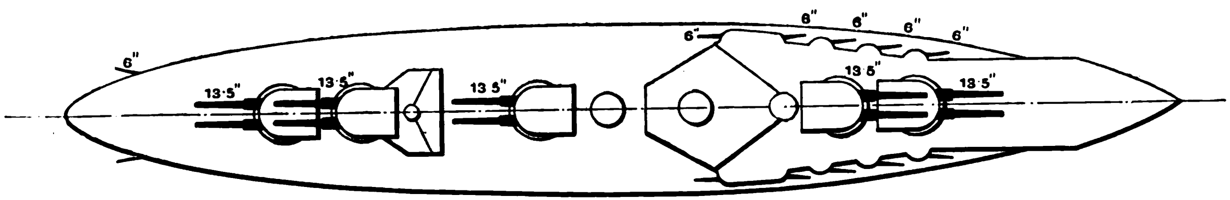
GREAT BRITAIN.

BATTLESHIPS.

Iron Duke. **Marlborough.** **Benbow.** **Emperor of India.**





Length, 580 ft. ; 25,000 tons ; Speed, 21-22 knots ; 1914—Building ;
Armament, 10—13·5 in., 12—6 in., 2—3 in., 4—3 pr.

See page 196.

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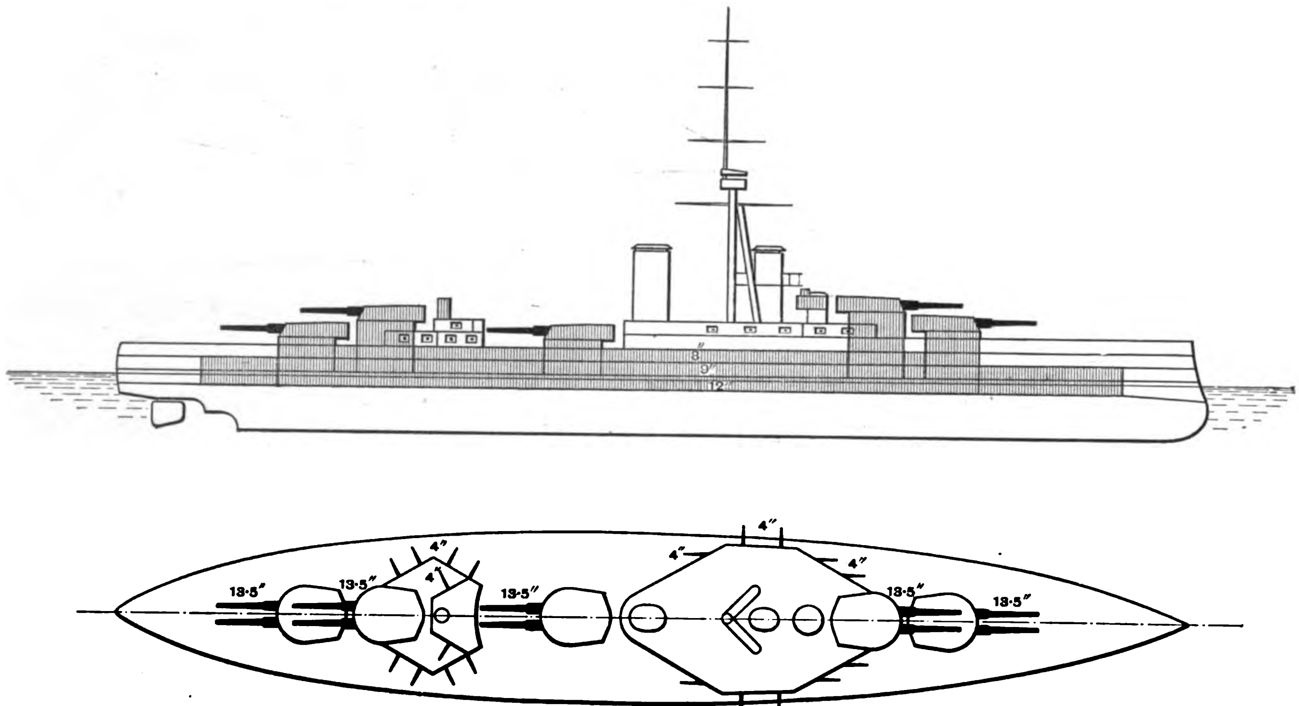
GREAT BRITAIN.

BATTLESHIPS.

Orion. Conqueror. Monarch. Thunderer. Ajax. Audacious. Centurion. King George V



Orion . . . . Conqueror . . Monarch . . . Thunderer . .	Length, 545 ft. ; 22,500 tons ; Speed, 21-22 knots ; Armament, 10—13·5 in., 16—4 in., 4—3 pr., 5 small ; Completed, 1911-12.
Ajax . . . . Audacious . . Centurion . . King George V.	Length, 555 ft. ; 23,000 tons ; Speed, 22 knots ; Armament, 10—13·5 in., 16—4 in., 4—3 pr. ; Completed, 1912-13.

See pages 196, 197.

PLATE 2.

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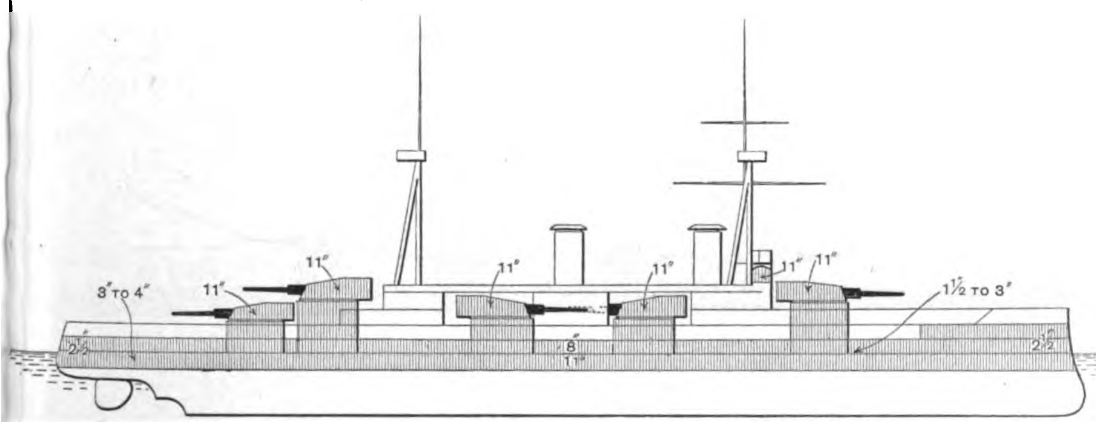
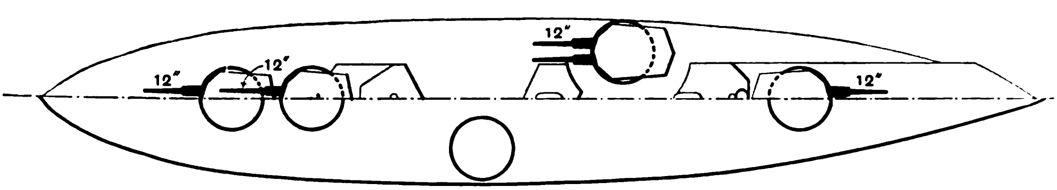
GREAT BRITAIN.

BATTLESHIPS.

Neptune. **Hercules.** **Colossus.**





Length, 510 ft.; 19,900–20,000 tons; Speed, 21·5–21·78 knots; Completed, 1911;
Armament, 10—12 in., 16—4 in., 4—3 pr., 5 small.

See pages 193, 197.

Plate 3.

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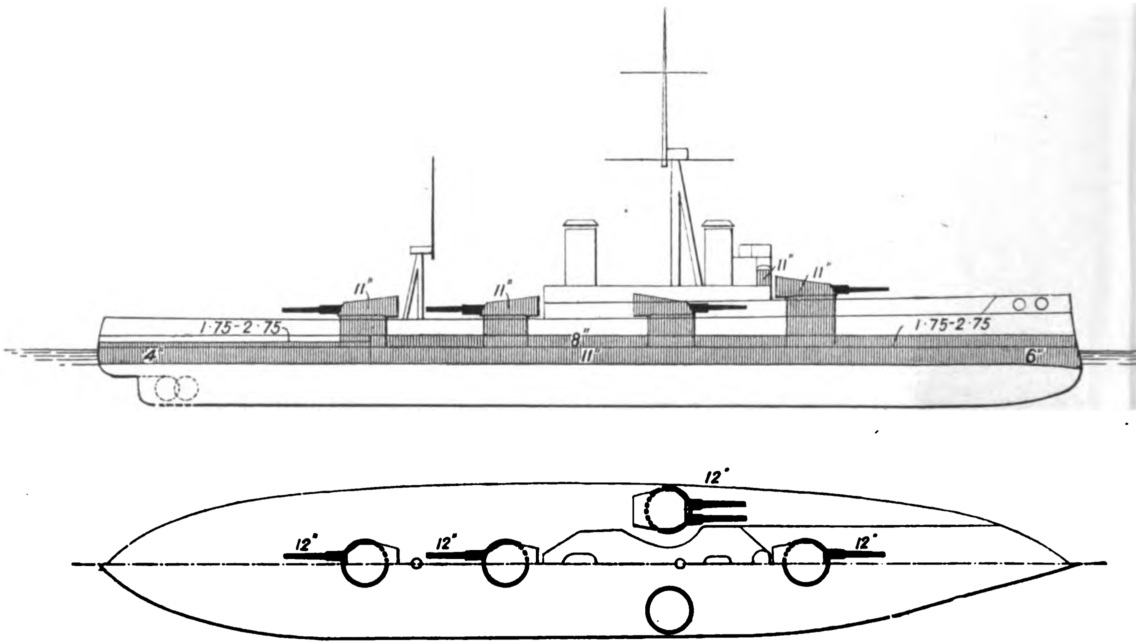
GREAT BRITAIN.

BATTLESHIPS.

Dreadnought. **Bellerophon.** **St. Vincent.** **Temeraire.** **Vanguard.** **Superb.** **Collingwood.**



Dreadnought.—Length, 490 ft. ; 17,900 tons ; Speed, 21·8 knots ; Completed, 1906.
Armament, 10—12 in., 24—12 pr., 5 small.

Bellerophon
Temeraire
Superb
—Length, 490 ft. ; 18,600 tons ; Speed, 21·6–22 knots ; Completed, 1909 ;
Armament, 10—12 in., 16—4 in., 4—3 pr., 5 small.

St. Vincent
Collingwood
Vanguard
—Length, 500 ft. ; 19,250 tons ; Speed, 21·5–22·1 knots ; Completed, 1910
Armament, 10—12 in., 18—4 in., 4—3 pr., 5 small.

N.B.—The masts are differently arranged in the later ships.

See pages 193, 194, 198.

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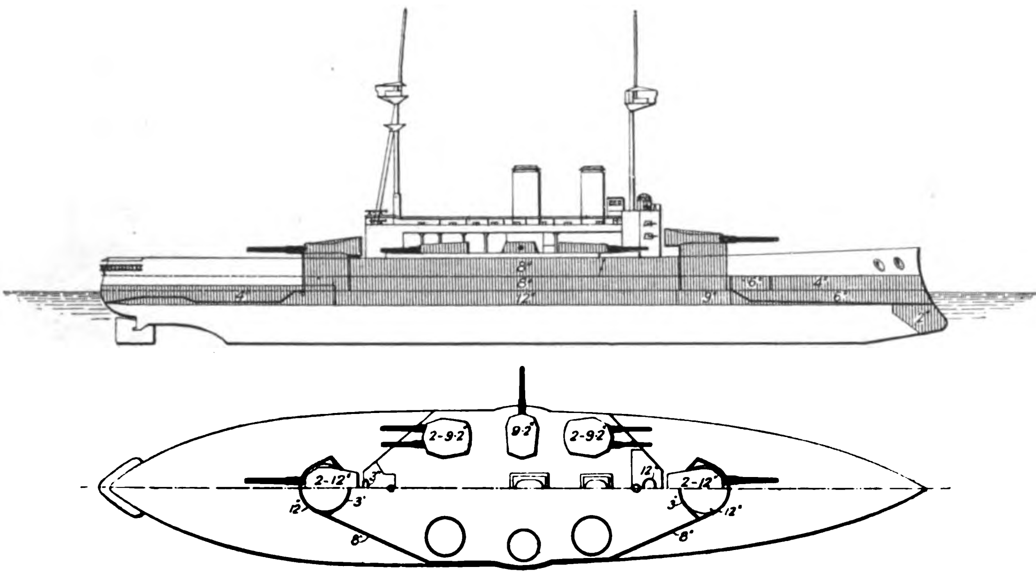
GREAT BRITAIN.

BATTLESHIPS.

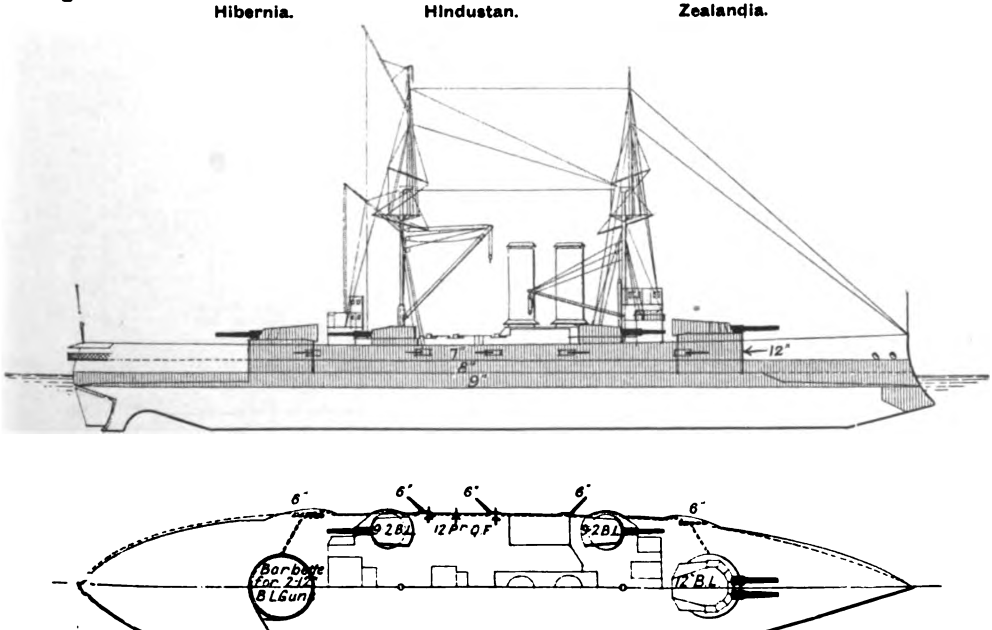
Lord Nelson. **Agamemnon.**



Length, 410 ft.; 16,500 tons; Speed, 18·75–18·9 knots; Completed, 1908; Armament, 4—12 in., 10—9·2 in., 24—12 pr., 2—3 pr., 5 small.

See page 197.

King Edward VII. **Africa.** **Britannia.** **Commonwealth.** **Dominion.**
Hibernia. **Hindustan.** **Zealandia.**



Length, 425 ft.; 16,350 tons; Speed, 18·5—19·5 knots; Completed, 1905–1906; Armament, 4—12 in., 4—9·2 in., 10—6 in., 12—12 pr., 12—3 pr.

See page 196.

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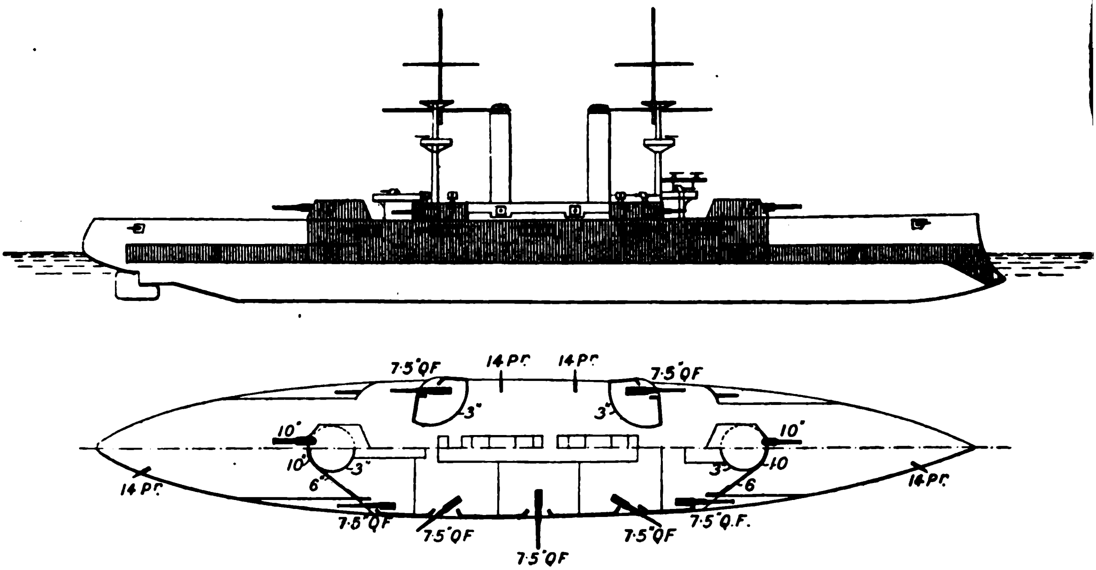
GREAT BRITAIN.

BATTLESHIPS.

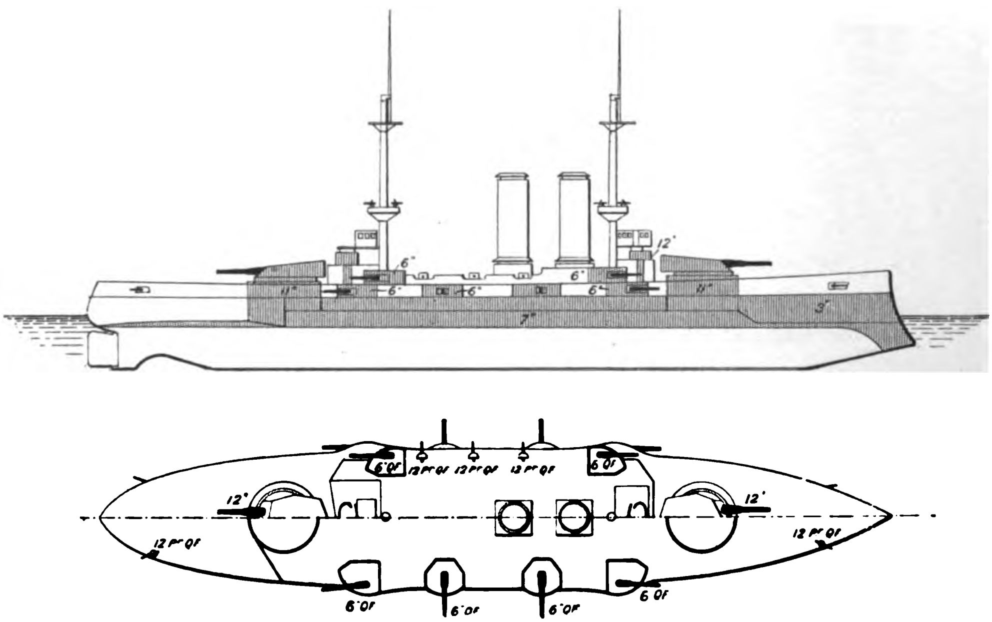
Swiftsure. **Triumph.**



Length, 436 ft. ; 11,800 tons ; Speed, 19·6 knots ; Completed, 1904 ;
Armament, 4—10 in., 14—7·5 in., 14—14 pr., 4—6 pr., and small.

See page 199.

Duncan. **Albemarle.** **Cornwallis.** **Exmouth.** **Russell.**



Length, 405 ft. ; 14,000 tons ; Speed, 18·6—19·3 knots ; Completed, 1903–1904 ;
Armament, 4—12 in., 12—6 in., 10—12 pr., 2—3 pr., and small.

See page 195.

PLATE 6.

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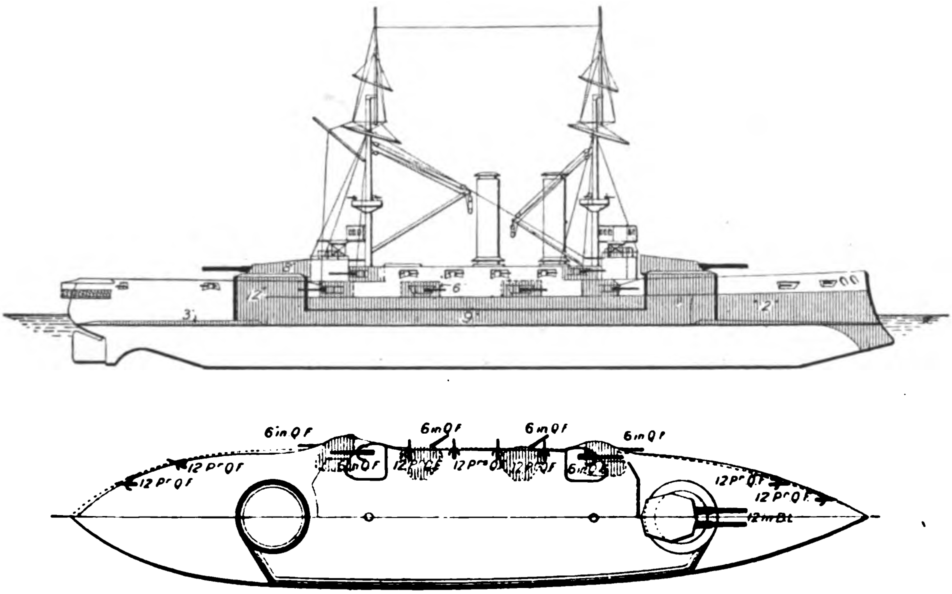
GREAT BRITAIN.

BATTLESHIPS.

Formidable. ***Bulwark.** **Implacable.** **Irresistible.** ***London.**
***Prince of Wales.** ***Queen.** ***Venerable.**

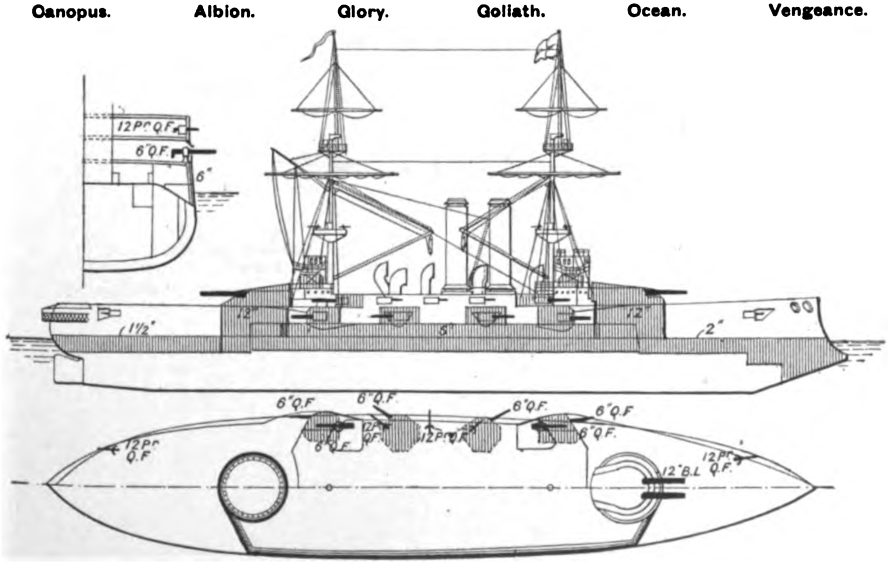


*In These Ships 9" Armour Tapers to 2" at 30 ft From Bow, & They Have no Forward Bulkhead

Length, 400 ft.; 15,000 tons; Speed, 18—18·3 knots; Completed, 1901-1904;
Armament, 4—12 in., 12—6 in., 16—12 pr., 2—3 pr., and small.

See page 195.

Canopus. **Albion.** **Glory.** **Goliath.** **Ocean.** **Vengeance.**



Length, 390 ft.; 12,950 tons; Speed, 17·8—18·7 knots; Completed, 1899-1902;
Armament, 4—12 in., 12—6 in., , 10—12 pr., 6—3 pr., and small.

See page 193.

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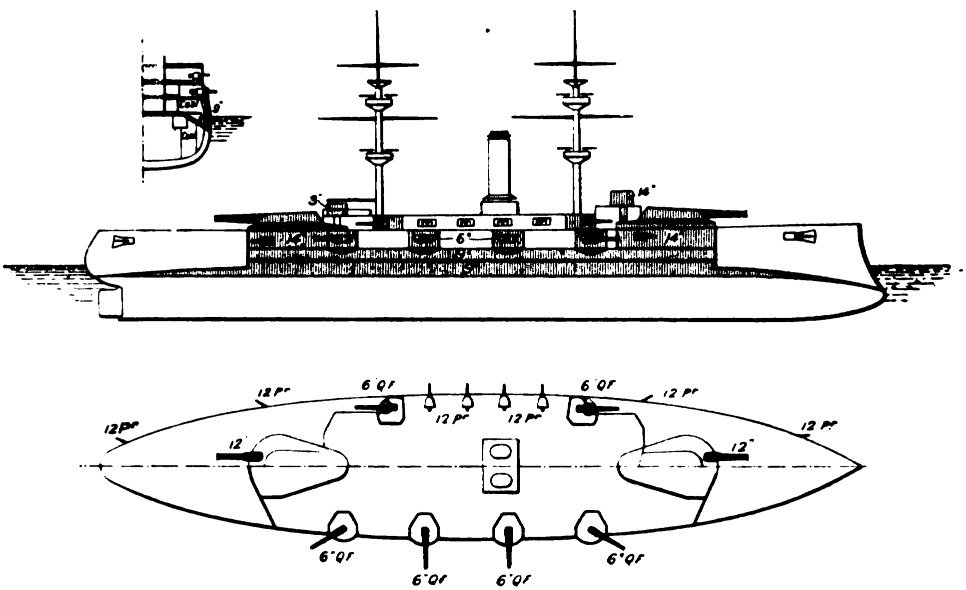
GREAT BRITAIN.

BATTLESHIPS.

Majestic. Cæsar. Mars. Hannibal. Prince George. Illustrious. Jupiter Victorious. Magnificent.



Length, 390 ft.; 14,900 tons; Speed, 16·5–18·7 knots; Completed, 1895–1898;
Armament, 4—12 in., 12—6 in., 16—12 pr., 4—3 pr., 2 small.

See page 197.

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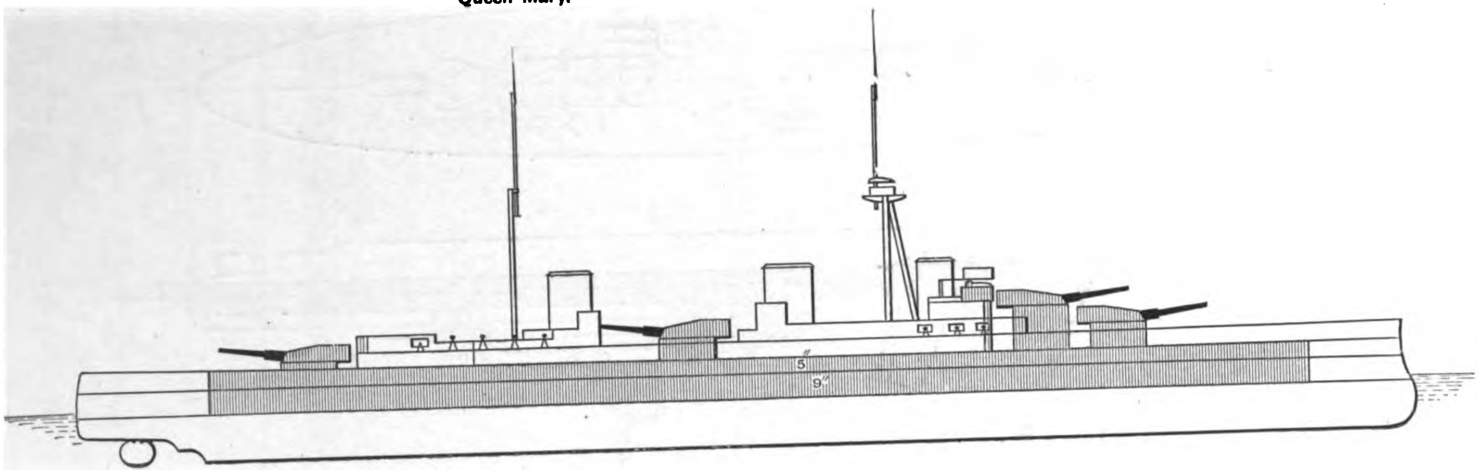
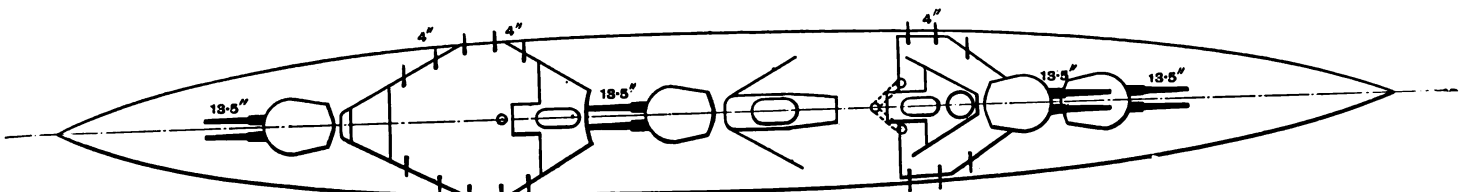
GREAT BRITAIN.

BATTLE CRUISERS.

Queen Mary. Lion. Princess Royal.





Length, 660 ft.; 26,350–27,000 tons; Speed, 28–28·5 knots; Completed, 1912–13; Armament, 8—13·5 in., 16—4 in., 4—3 pr., 5 small.

See pages 197, 198.

PLATE 9.

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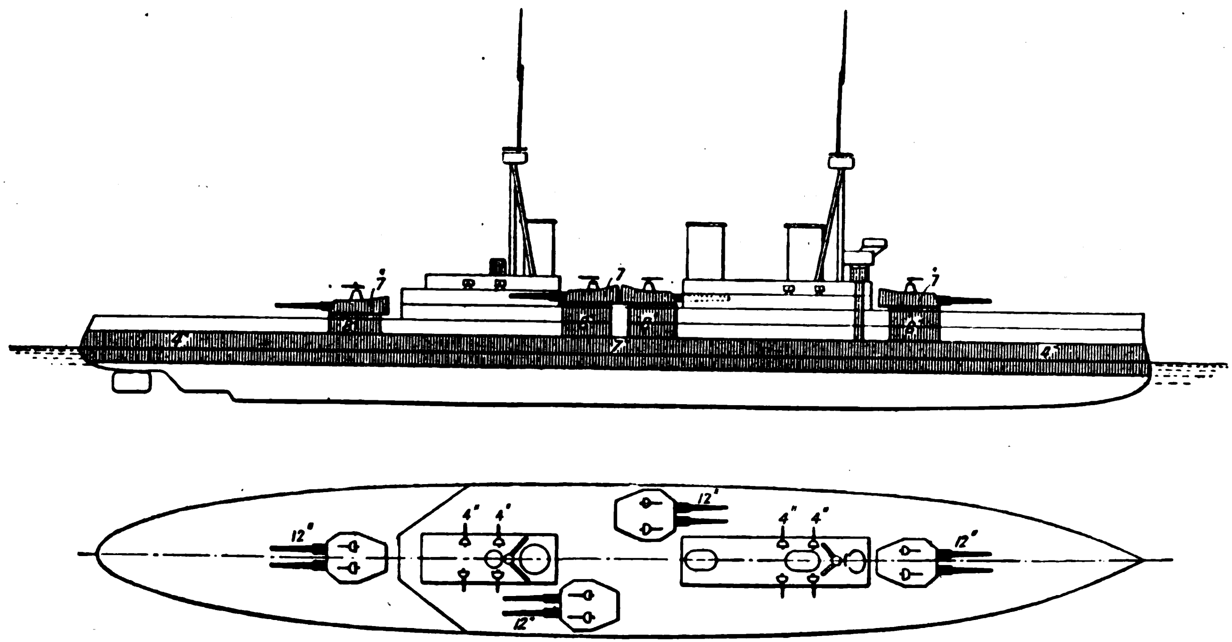
GREAT BRITAIN.

BATTLE CRUISERS.

Invincible. Indomitable. Inflexible. Indefatigable.*



Invincible, Indomitable, Inflexible } Length, 530 ft. ; 17,250 tons ; Speed, 26 knots ; Completed, 1908-9 ; Armament, 8—12 in., 16—4 in., 5 small.

* Indefatigable : Length, 555 ft. ; 18,750 tons ; Speed, 25 knots ; Completed, 1911 ; Armament, 8—12 in., 16—4 in., 4—3 pr., 5 small.

* The centre turrets are more *en échelon* than in the three earlier ships.

See page 196.

Plate 10.

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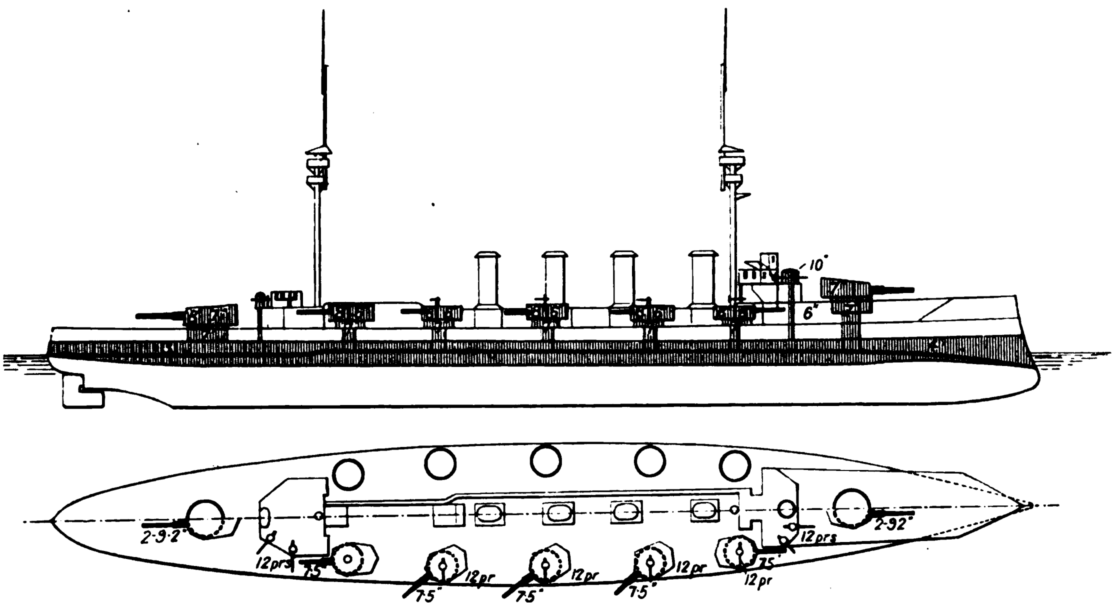
GREAT BRITAIN.

ARMOURED CRUISERS.

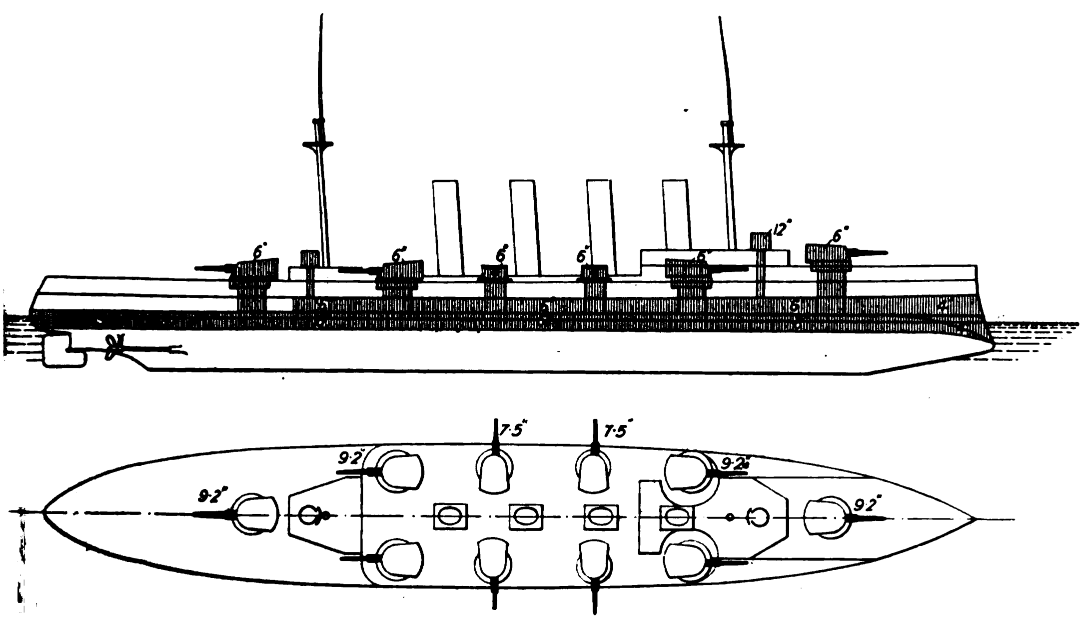
Minotaur. **Defence.** **Shannon.**



Length, 490 ft.; 14,600 tons; Speed, 22·5–23·5 knots; Completed, 1908–1909;
Armament, 4—9·2 in., 10—7·5 in., 16—12 pr., 5 small.

See page 197.

Achilles. **Cochrane.** **Natal.** **Warrior.**



Length, 480 ft.; 13,550 tons; Speed, 22·3–23·3 knots; Completed, 1906–1907;
Armament, 6—9·2 in., 4—7·5 in., 24—3 pr., 2 small.

See page 192.

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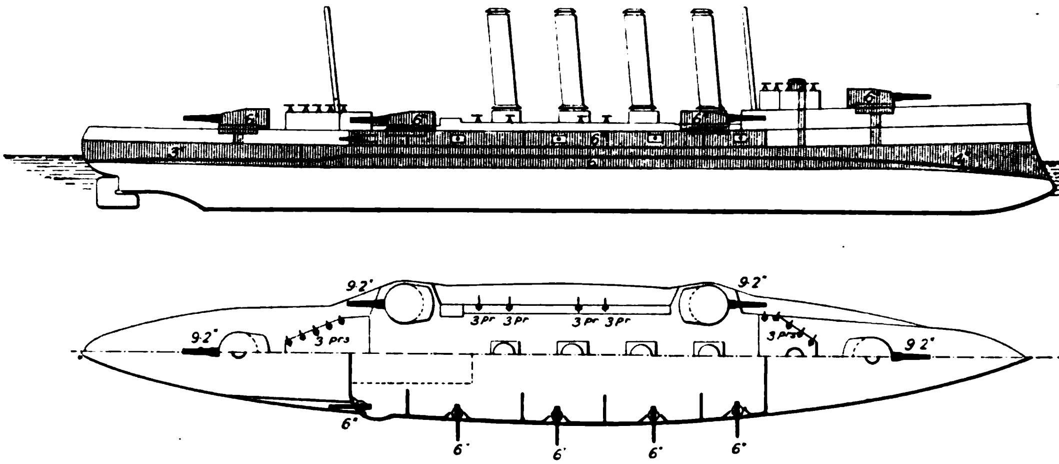
GREAT BRITAIN.

ARMOURED CRUISERS.

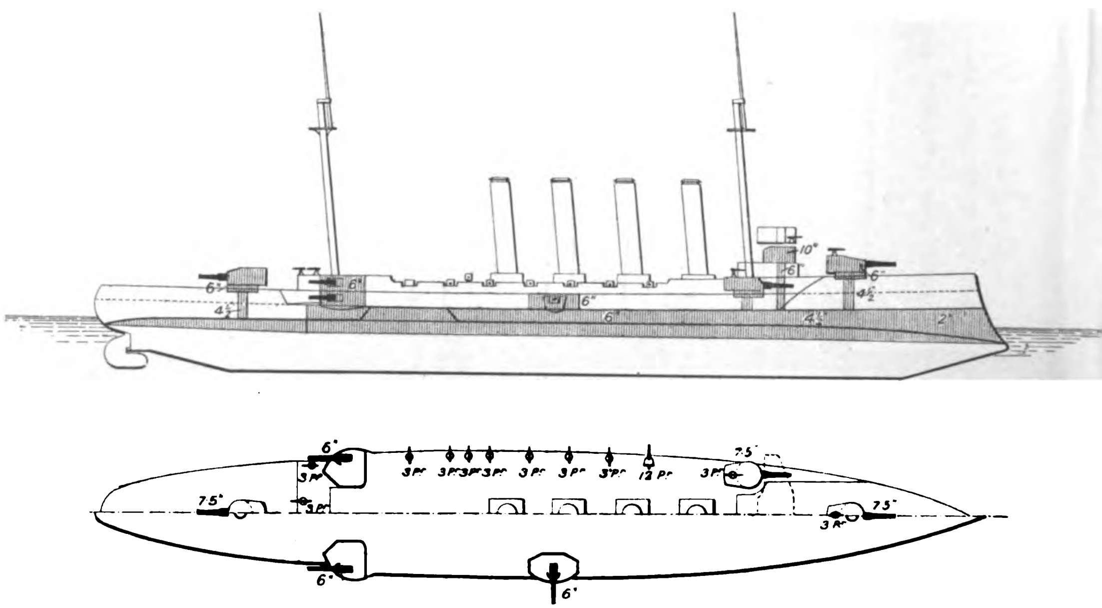
Duke of Edinburgh. **Black Prince.**



Length, 480 ft.; 13,550 tons; Speed, 22·8–23·6 knots; Completed, 1906; Armament, 6—9·2 in., 10—6 in., 20—3 pr., 2 small.

See page 194.

Devonshire. **Antrim.** **Argyll.** **Carnarvon.** **Hampshire.** **Roxburgh.**



Length, 450 ft.; 10,850 tons; Speed, 22·2–23·6 knots; Completed, 1905–1906; Armament, 4—7·5 in., 6—6 in., 20—3 pr., 2 small.

See page 194.

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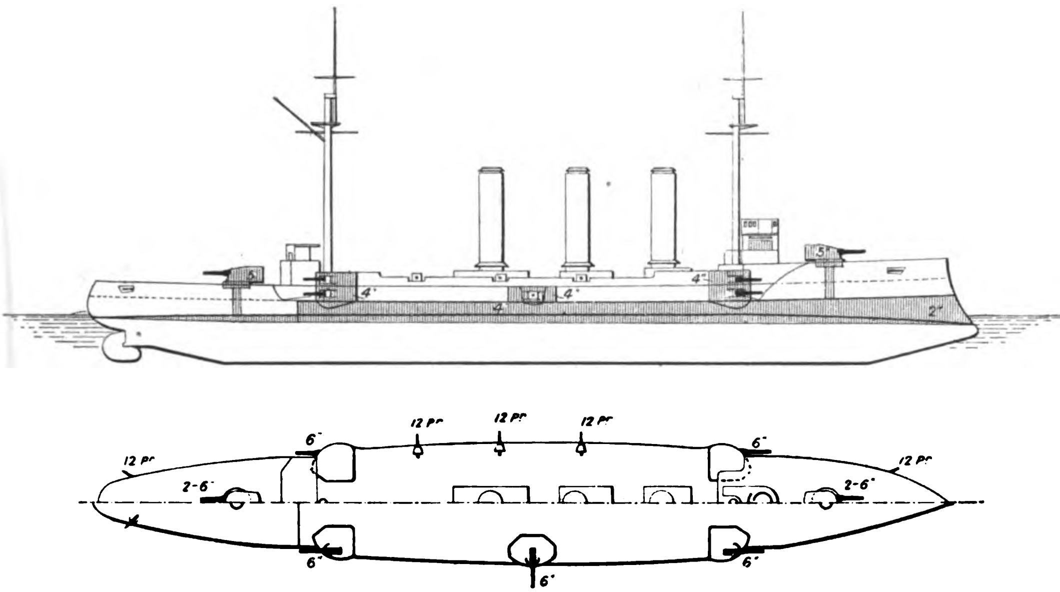
GREAT BRITAIN.

ARMOURED CRUISERS.

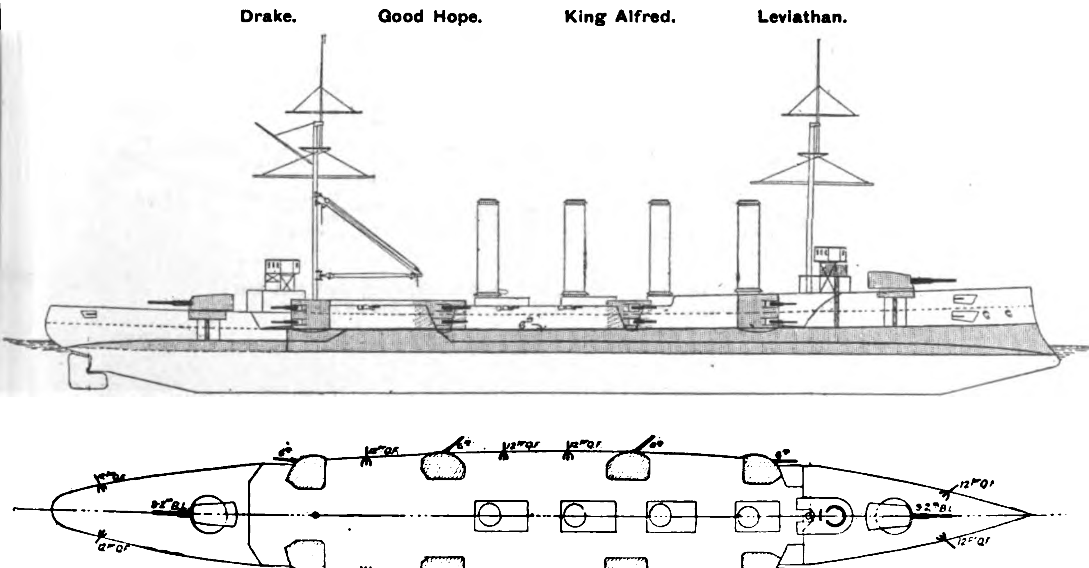
Monmouth. **Berwick.** **Cornwall.** **Cumberland.** **Donegal.** **Essex.**
Kent. **Lancaster.** **Suffolk.**



Length, 440 ft. ; 9,800 tons ; Speed, 22·7–24·7 knots ; Completed, 1903–1905 ;
Armament, 14—6 in., 8—12 pr., 3—3 pr., 9 small.

See page 197.

Drake. **Good Hope.** **King Alfred.** **Leviathan.**



Length, 500 ft. ; 14,100 tons ; Speed, 23·3–24·1 knots. ; Completed, 1902–1903 ;
Armament, 2—9·2 in., 16—6 in., 12—12 pr., 3—3 pr., 2 small.

See page 194.

PLATE 13.

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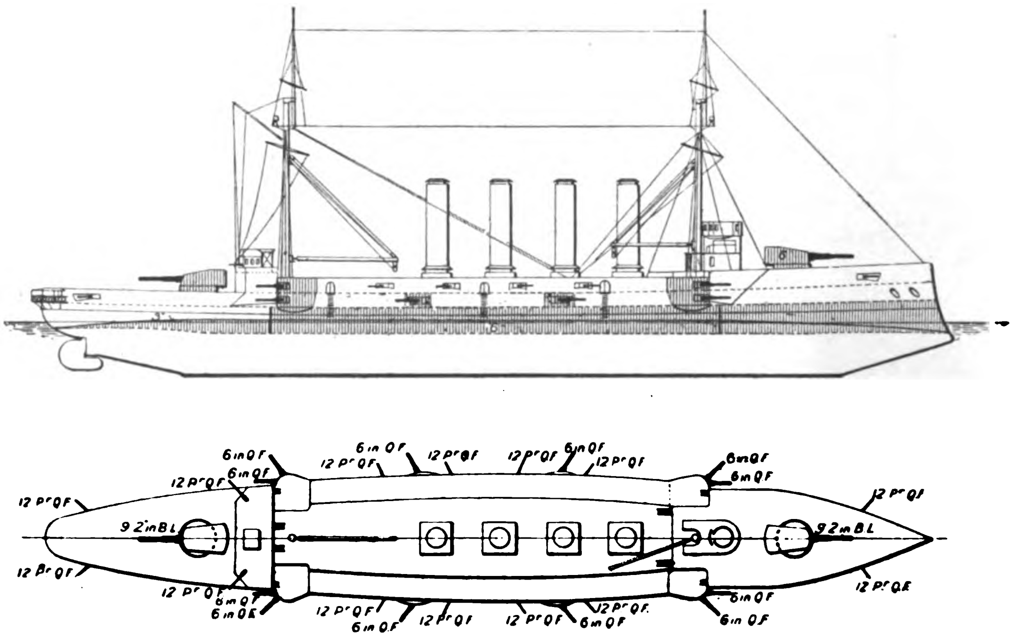
ARMOURED CRUISERS.

Cressy. Aboukir. Bacchante. Euryalus. Hogue. Sutlej.



Length, 440 ft. ; 12,000 tons ; Speed, 20·8—21·8 knots ; Completed, 1901-1904 ;
Armament, 2—9·2 in., 12—6 in., 12—12 pr., 3—3 pr., 8 small.

See page 194.

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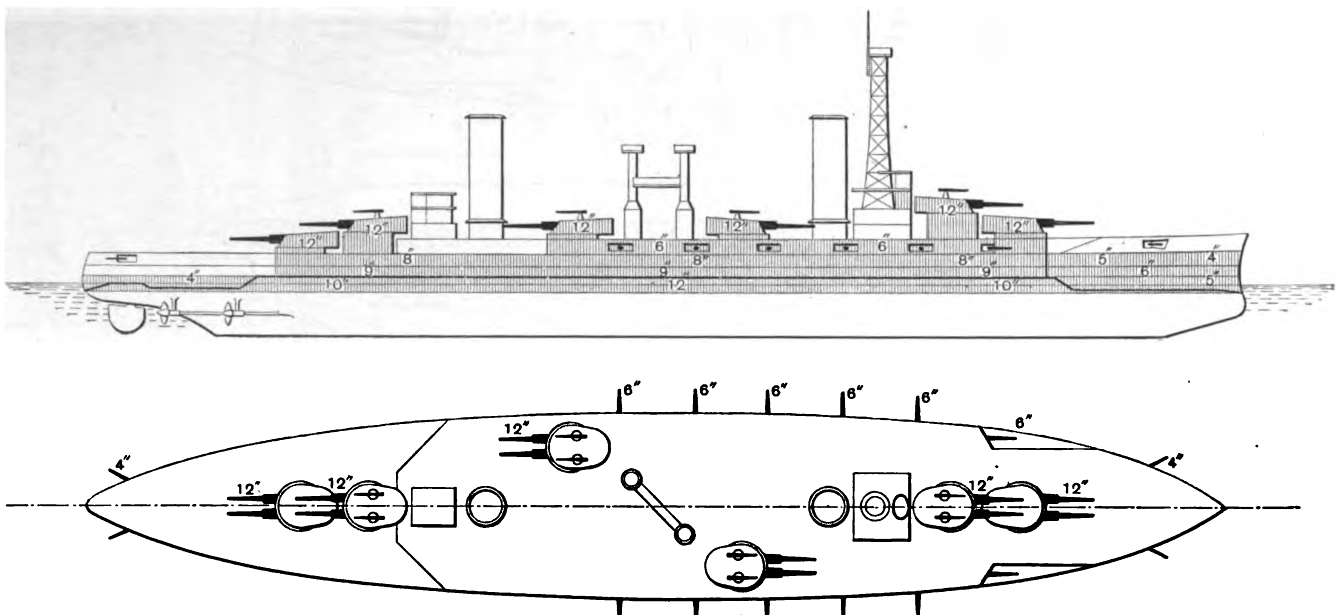
ARGENTINE.

BATTLESHIPS.

Moreno. Rivadavia.



Length, 585 ft.; 27,600 tons; Speed, 22·5 knots; Completed, 1914;
Armament, 12—12 in., 12—6 in., 16—4 in., 10 small.

See page 208.

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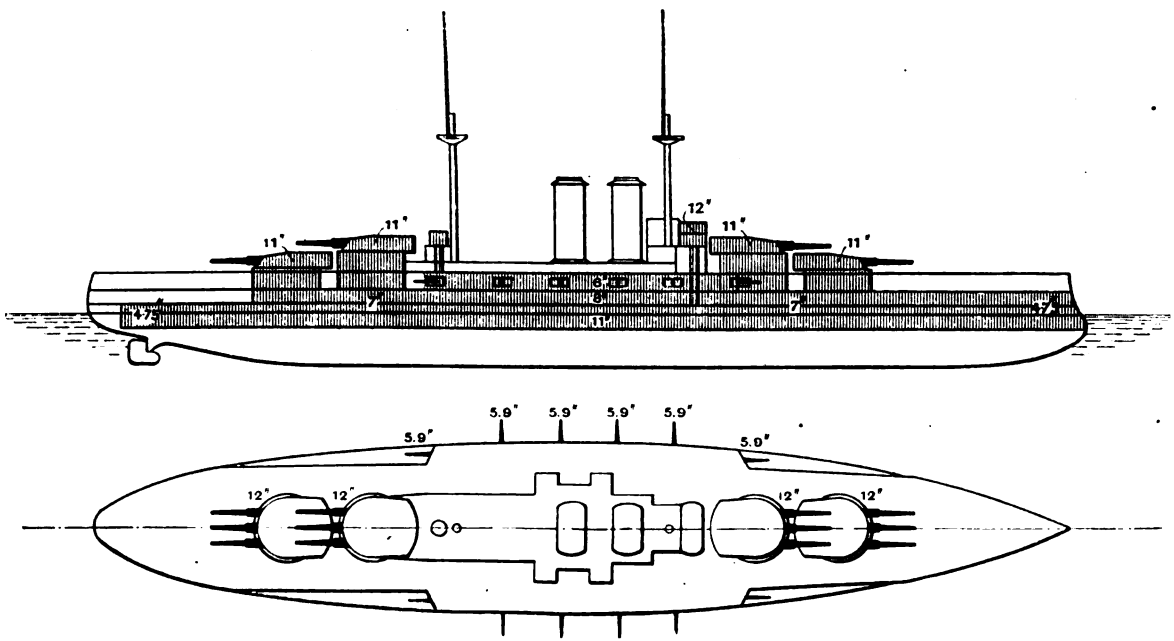
AUSTRIA.

BATTLESHIPS.

Viribus Unitis. Prinz Eugen. Tegetthoff. Szent Istvan.



Length, 495 ft.; 20,000 tons; Speed, 20·7 knots; Completed 1913 and Building;
Armament, 12—12 in., 12—5·9 in., 18—12 pr., 6 small.

See page 210.

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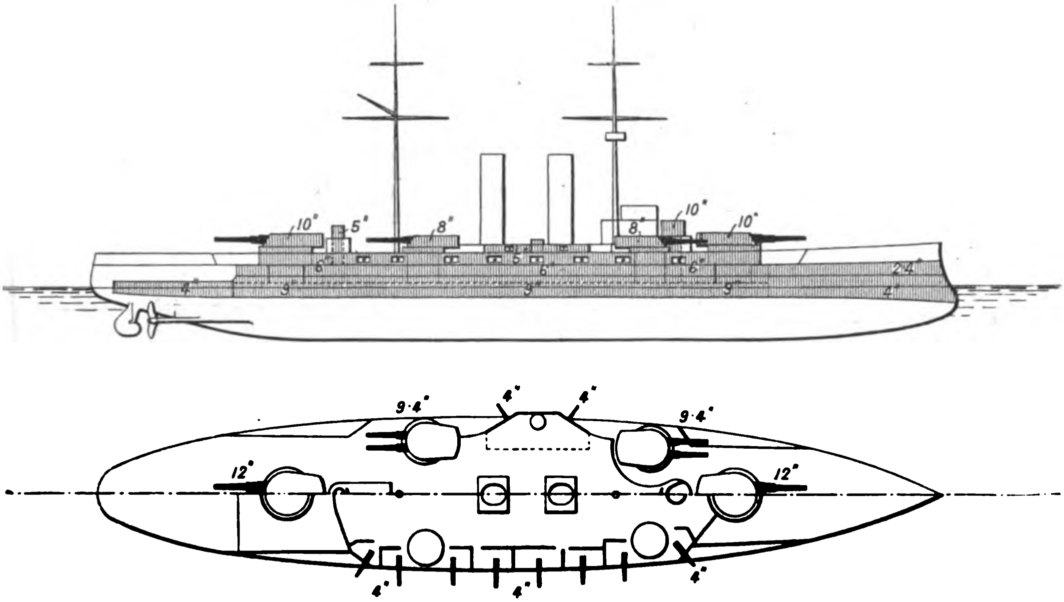
AUSTRIA.

BATTLESHIPS.

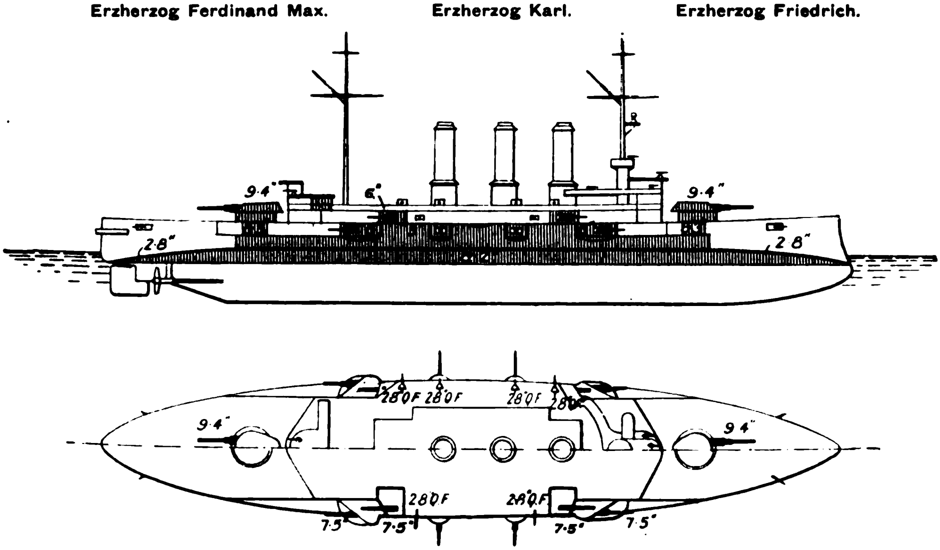
Erzherzog Franz Ferdinand. **Radetzky.** **Zrinyi.**



**Length, 451 ft. ; 14,226 tons ; Speed, 20·5 knots ; Completed, 1910–1911 ;
Armament, 4—12 in., 8—9·4 in., 20—3·9 in., 6—12 pr., 2 small.**

See page 210.

Erzherzog Ferdinand Max. **Erzherzog Karl.** **Erzherzog Friedrich.**



**Length, 390 ft. ; 10,433 tons ; Speed, 20—20·6 knots ; Completed, 1905–1907 ;
Armament, 4—9·4 in., 12—7·5 in., 12—2·8 in., 16 small.**

See page 210.

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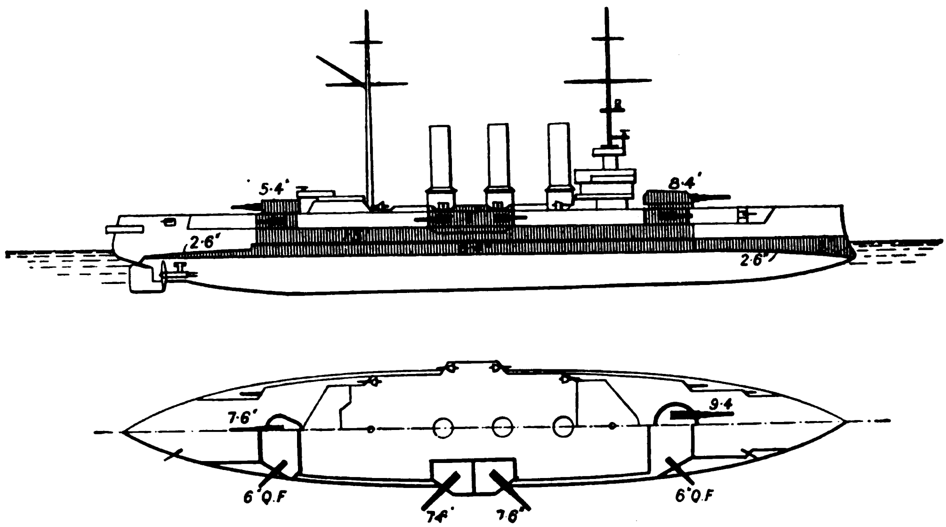
ARMOURED CRUISERS.

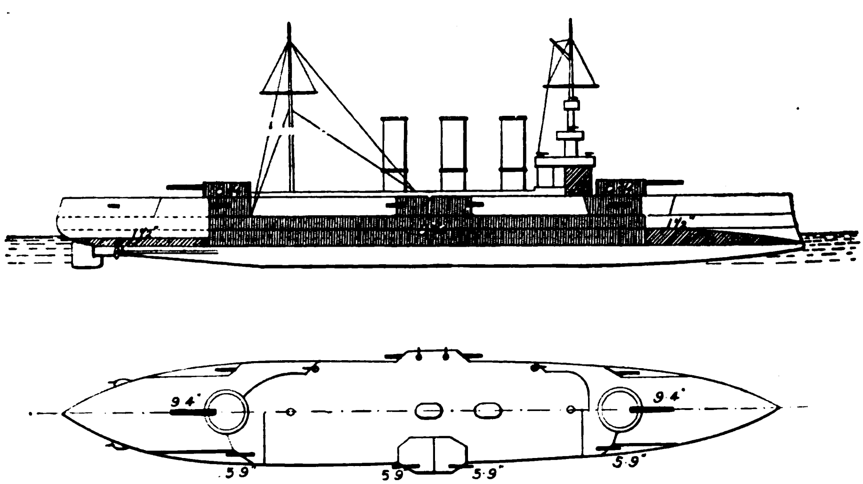
St. Georg.



Length, 384 ft.; 7185 tons; Speed, 22 knots; Completed, 1906;
Armament, 2—9·4 in., 5—7·6 in., 4—5·9 in., 9—2·8 in., 16 small.

See page 210.

Kaiser Karl VI.



Length, 367 ft.; 6151 tons; Speed, 20·7 knots; Completed, 1900
Armament, 2—9·4 in., 8—5·9 in., 19 small.

See page 210.

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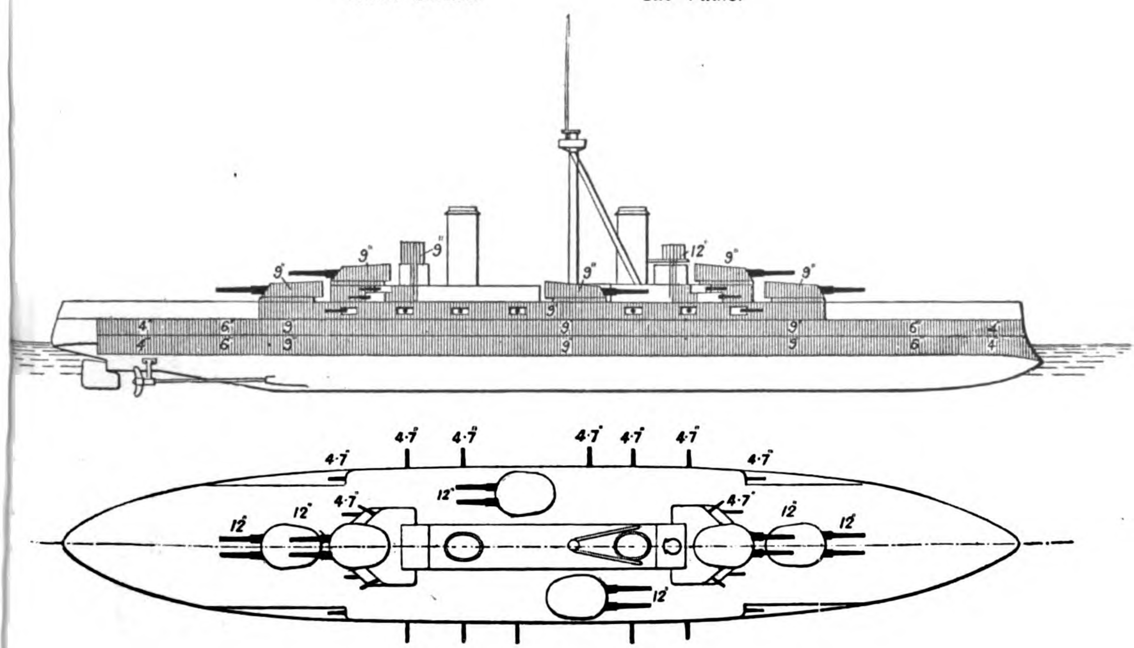
BRAZIL.

BATTLESHIPS.

Minas Geraes. Sao Paulo.



Length, 500 ft.; 19,281 tons; Speed, 21 knots; Completed, 1909, 1910.
Armament, 12—12 in., 22—4·7 in., 8 small.

See page 212.

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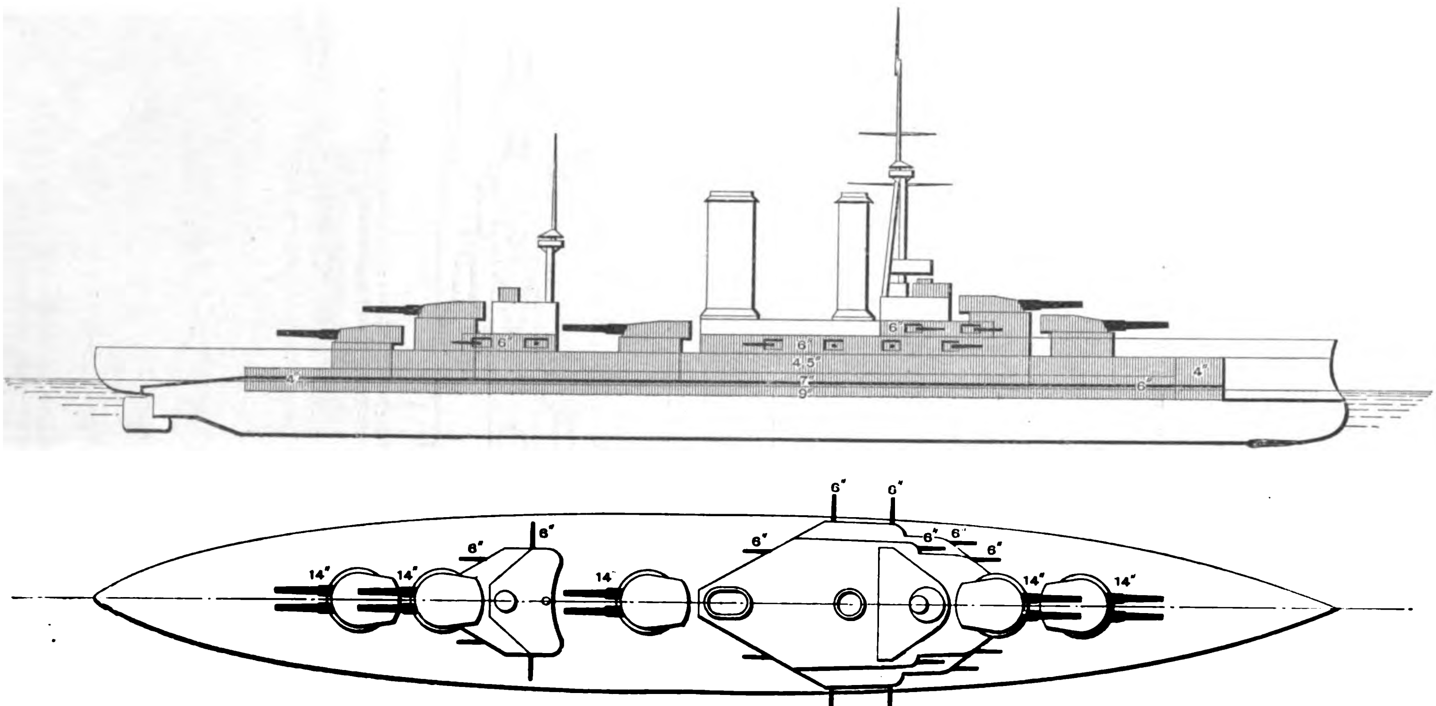
CHILE.

BATTLESHIPS.

Almirante Cochrane. **Almirante Latorre.**



Length, 625 ft. ; 28,000 tons ; Speed, 23 knots ; Building ;
Armament, 10—14 in. ; 16—6 in. ; 4—3 in. and smaller.

See page 236.

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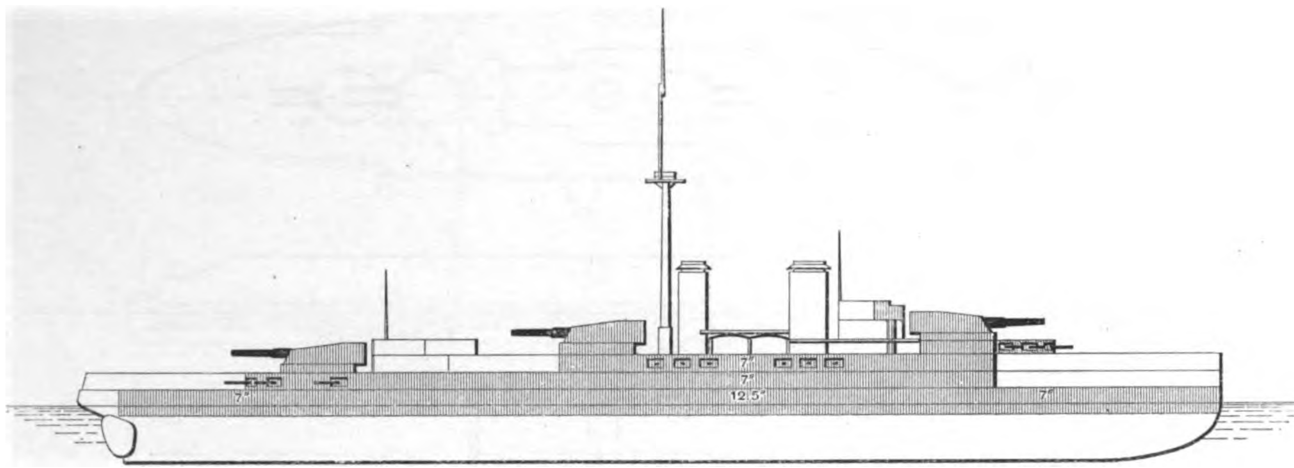
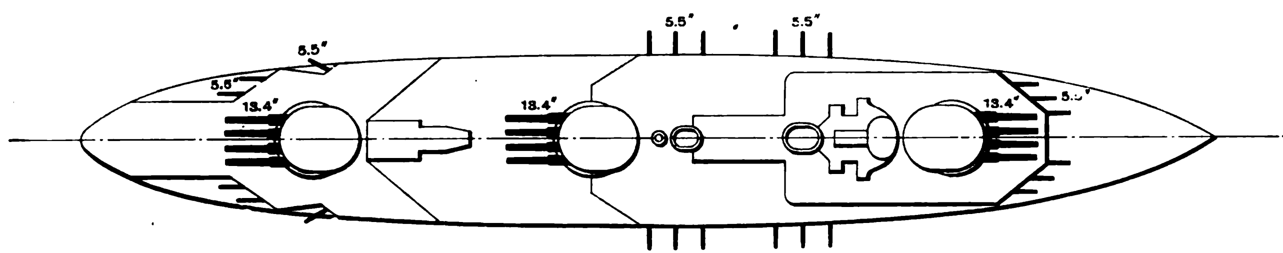
FRANCE.

BATTLESHIPS.

Normandie. Flandre. Gascogne. Languedoc. Béarn.





Length, 574 ft.; 24,830 tons; Speed, 21 knots; Building;
Armament, 12—13·4 in., 24—5·5 in., 4—3 pr.

See page 219.

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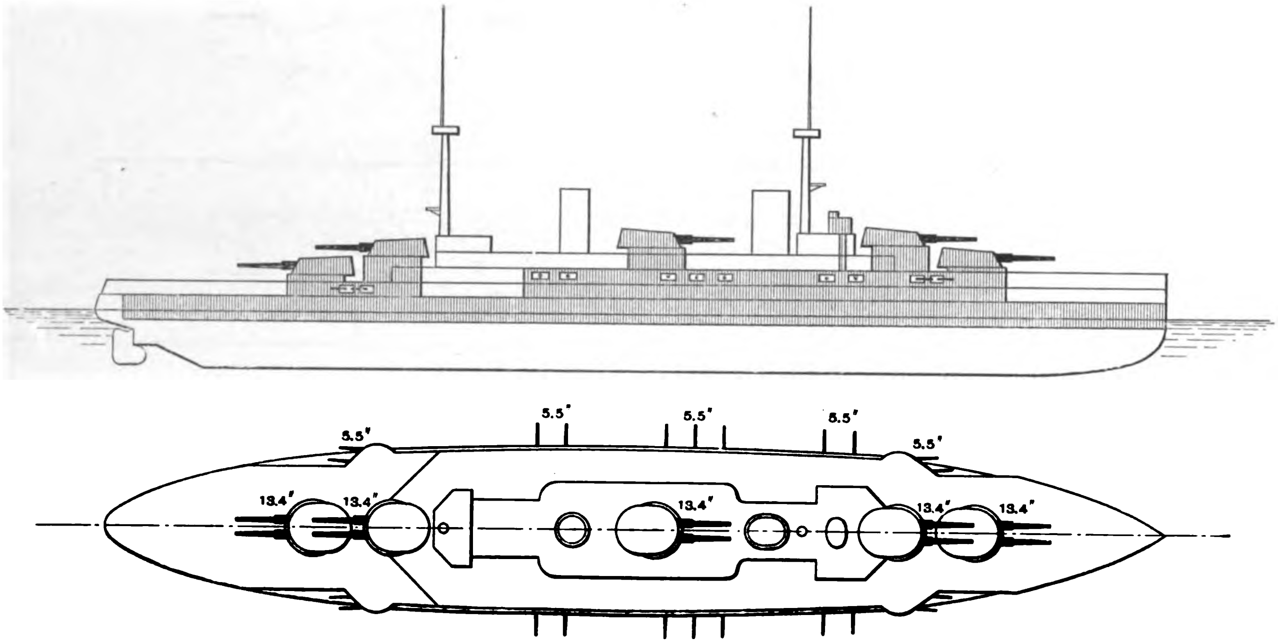
FRANCE.

BATTLESHIPS.

Bretagne. Provence. Lorraine.



Length, 546 ft.; 23,177 tons; Speed, 20 knots; Building; Armament, 10—13·4 in., 22—5·5 in., 8 small.

See page 217.

PLATE 22.

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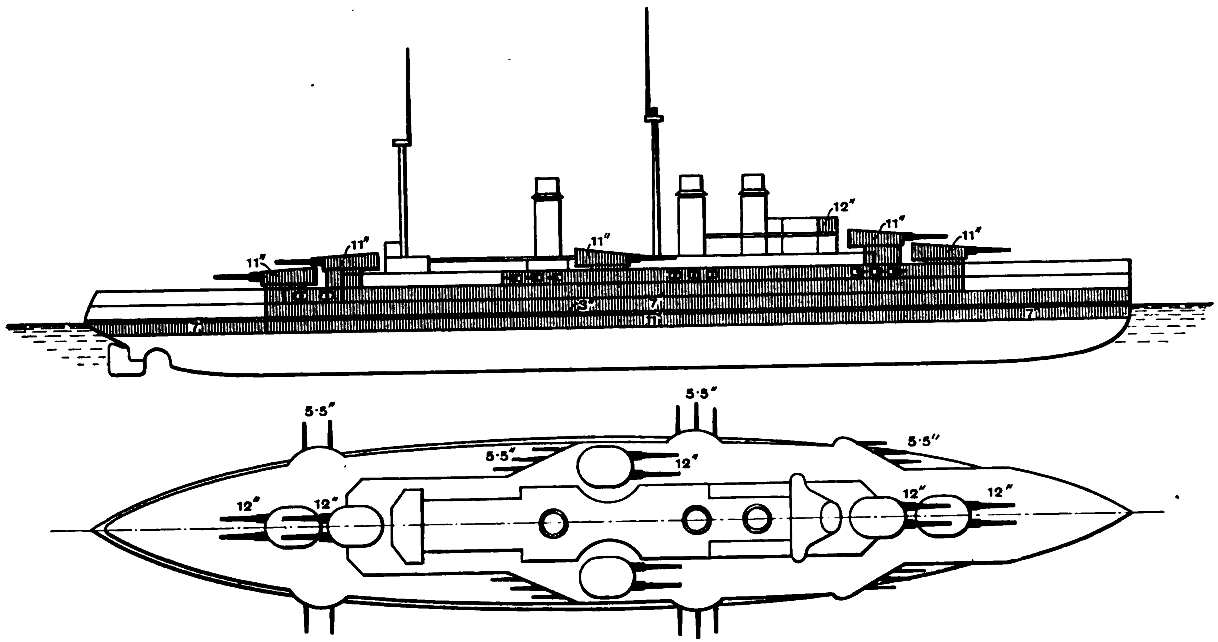
FRANCE.

BATTLESHIPS.

Jean Bart. Courbet. France. Paris.



Length, 546 ft.; 23,100 tons; Speed, 20 knots; Completed 1913-14;
Armament, 12—12 in., 22—5·5 in., 4—3 pr

See page 219.

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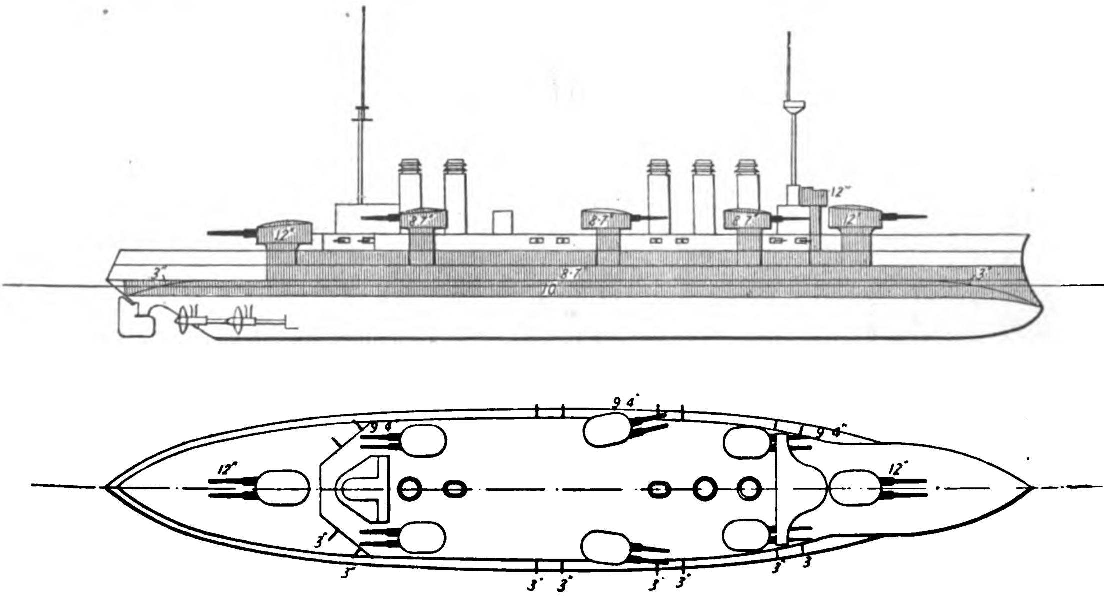
FRANCE.

BATTLESHIPS.

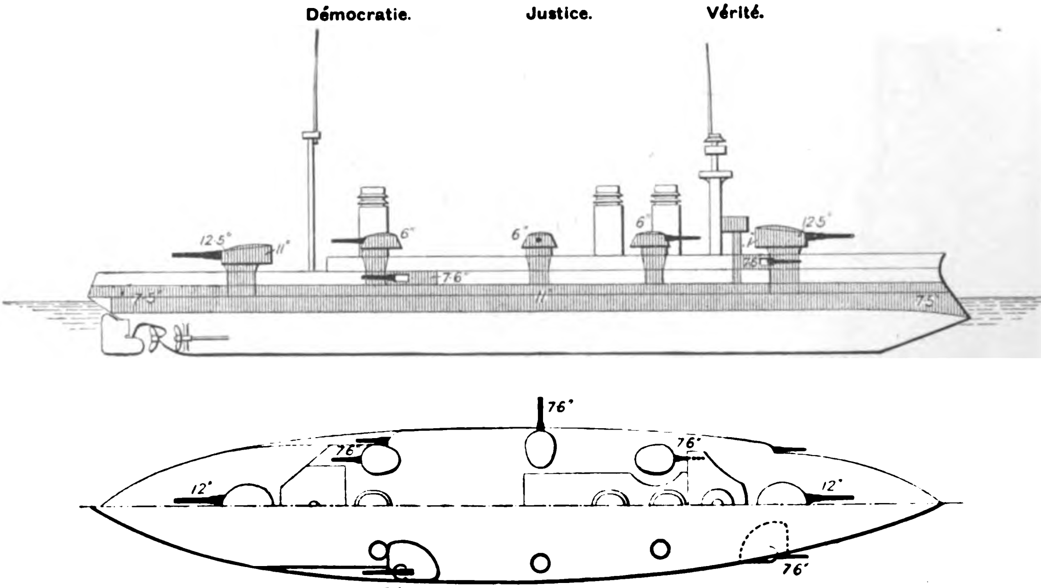
Danton. Condorcet. Diderot. Mirabeau. Vergniaud. Voltaire.



Length, 476 ft.; 18,028 tons; Speed, 19·7–20·7 knots; Completed, 1911; Armament, 4—12 in., 12—9·4 in., 16—12 pr., 10 small.

See page 217.

Démocratie. Justice. Vérité.



Length, 439 ft.; 14,635 tons; Speed, 19·3 knots; Completed, 1907–1908; Armament, 4—12 in., 10—7·6 in., 28 small.

See page 217.

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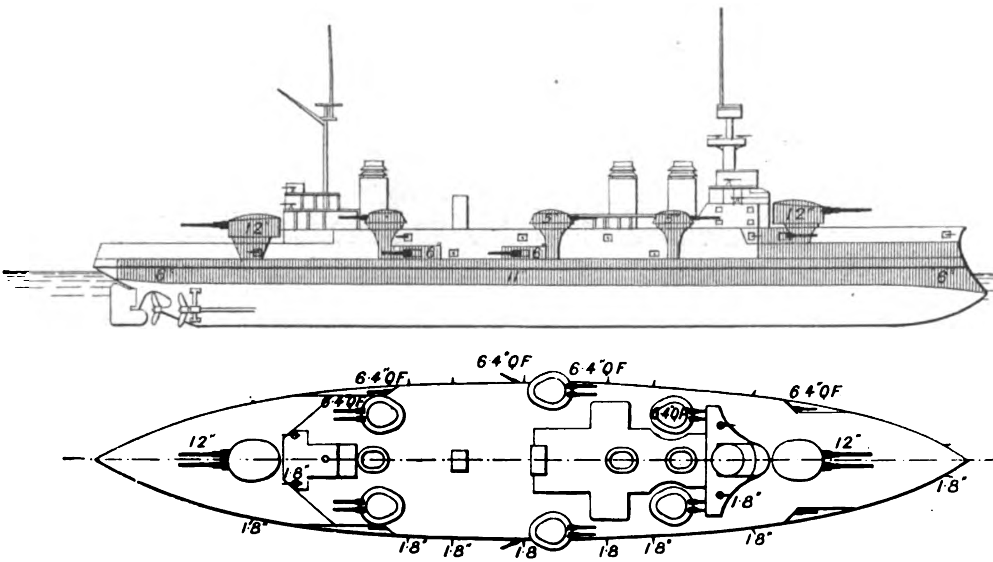
FRANCE.

BATTLESHIPS.

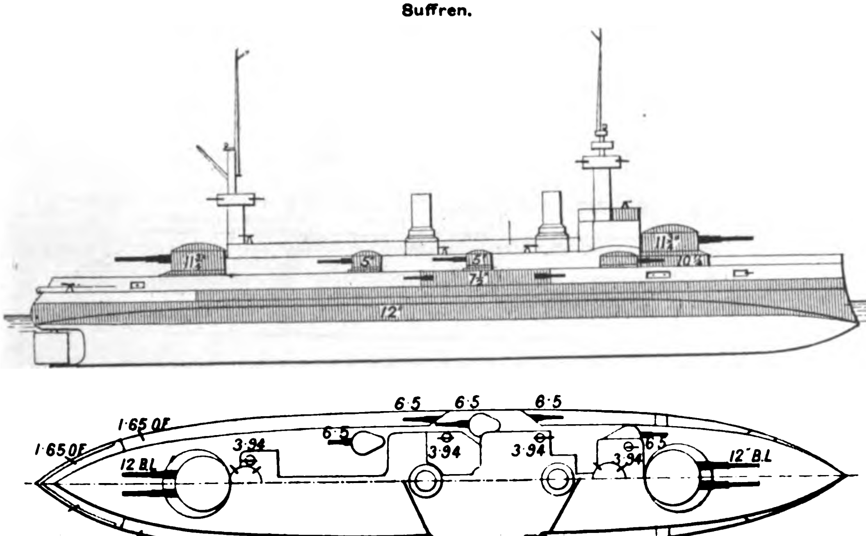
Patrie. **République.**



Length, 439 ft. ; 14,635 tons ; Speed, 19·1 knots ; Completed, 1906 ;
Armament, 4—12 in., 18—6·4 in., 28 small.

See page 220.

Suffren.



Length, 412 ft. ; 12,527 tons ; Speed, 18 knots ; Completed, 1903 ;
Armament, 4—12 in., 10—6·5 in., 8—3·9 in., 22 small.

See page 220.

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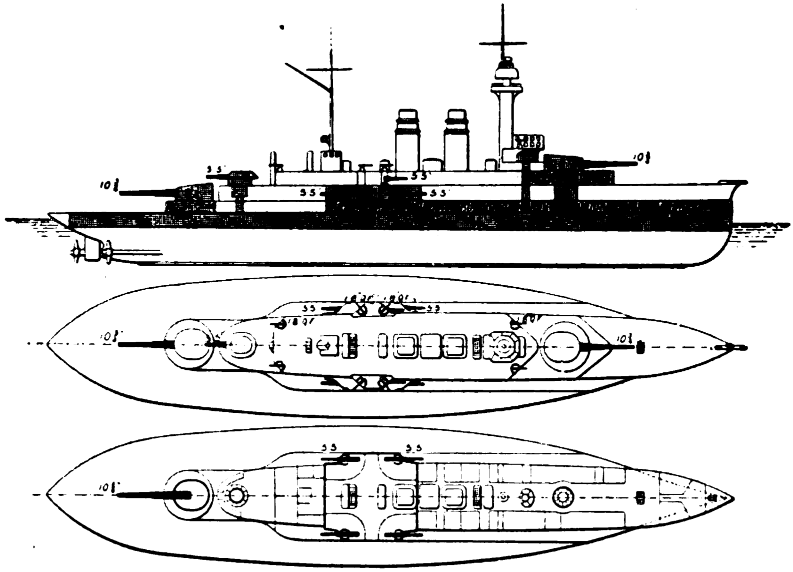
FRANCE.

BATTLESHIPS.

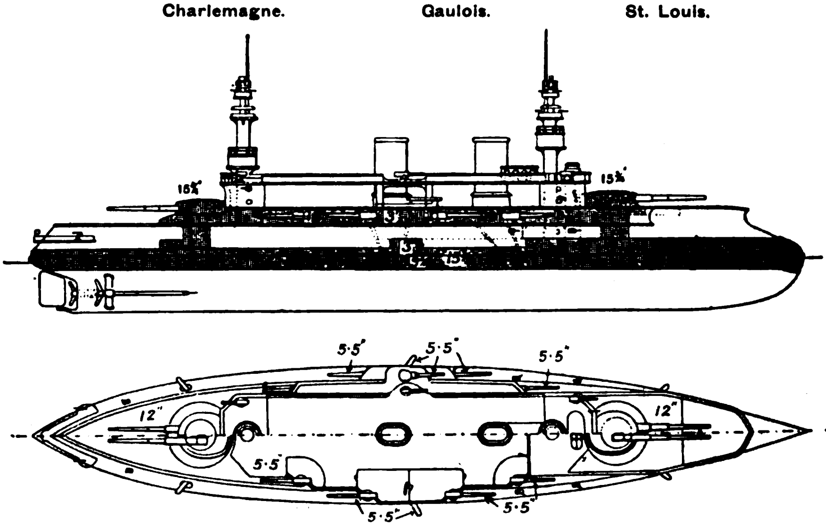
Henri IV.



Length, 354 ft.; 8807 tons; Speed, 17·2 knots; Completed, 1902;
Armament, 2—10·8 in., 7—5·5 in., 14 small.

See page 218.

Charlemagne. **Gaulois.** **St. Louis.**



Length, 385 ft.; 11,108 tons; Speed, 18 knots; Completed, 1898-1900;
Armament, 4—12 in., 10—5·5 in., 8—3·9 in., 34 small.

See page 217.

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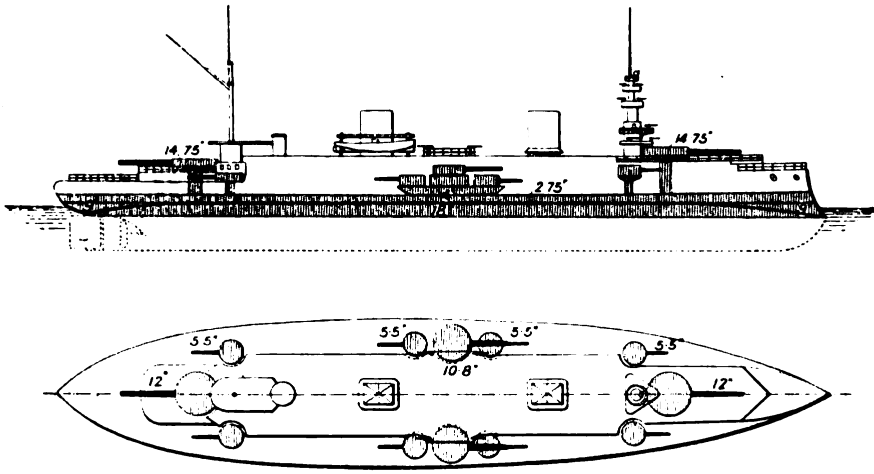
FRANCE.

BATTLESHIP.

Carnot.

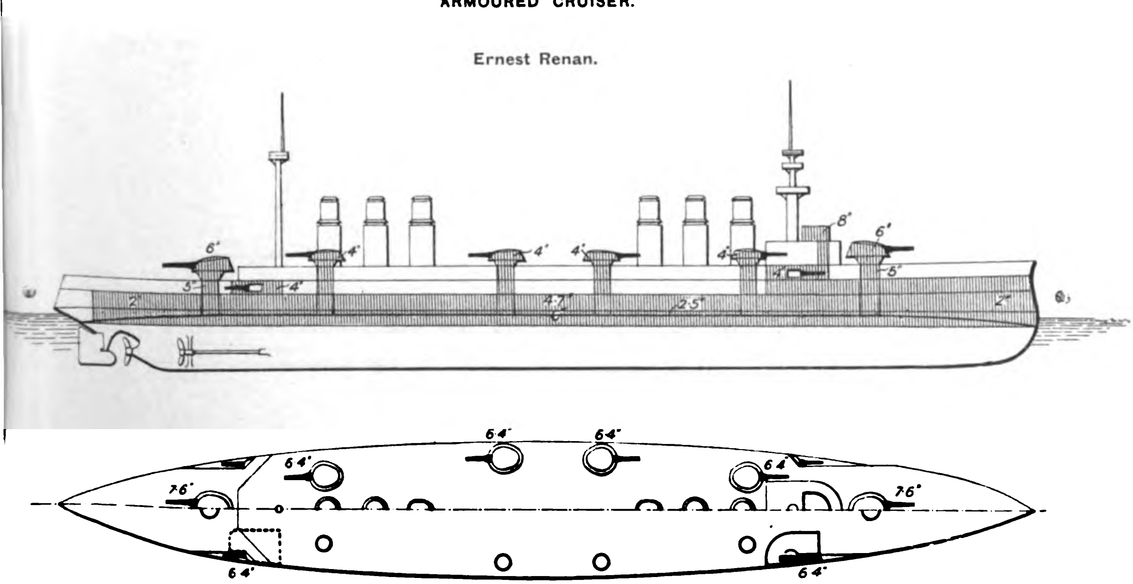


Length, 382 ft.; 11,954 tons; Speed, 17·8 knots; Completed, 1897; Armament, 2—12 in., 2—10·8 in., 8—5·5 in., 30 small.

See page 217.

ARMOURED CRUISER.

Ernest Renan.



Length, 515 ft.; 13,427 tons; Speed, 25·5 knots; Completed, 1909; Armament, 4—7·6 in., 12—3·4 in., 24 small.

See page 218.

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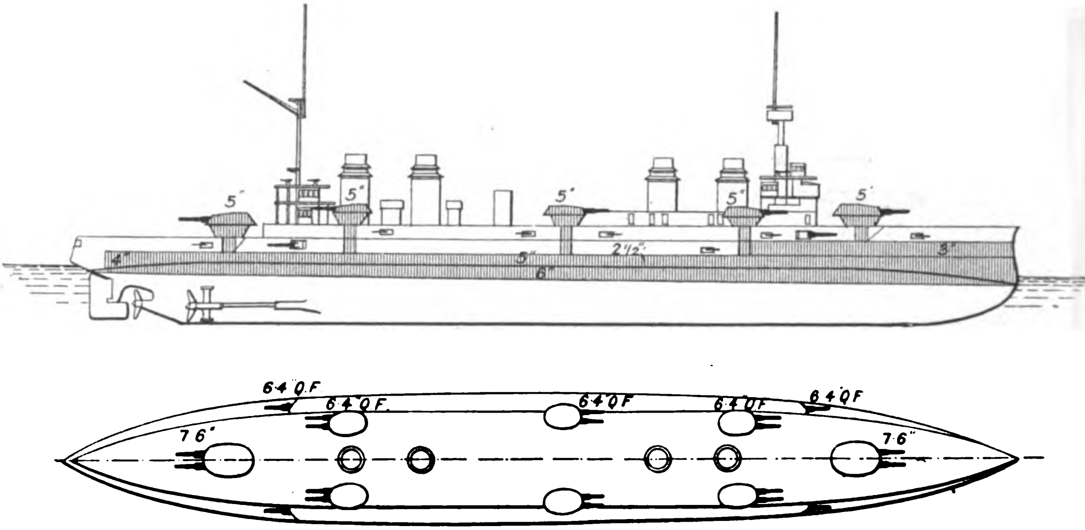
FRANCE.

ARMOURED CRUISERS.

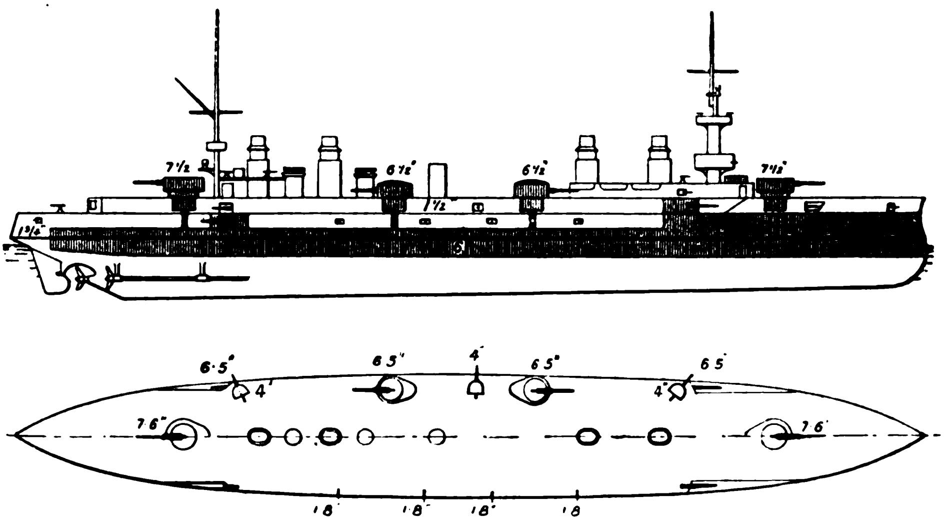
Léon Gambetta. Jules Ferry. Victor Hugo.



Length, 480 ft.; 12,351 tons; Speed, 22·5–23 knots; Completed 1904–1907;
Armament, 4—7·6 in., 16—6·4 in., 24 small.

See page 219.

Amiral Aube. Condé. Gloire. Marseillaise.



Length, 453 ft.; 9856 tons; Speed, 21–21·9 knots; Completed, 1903–1904;
Armament, 2—7·6 in., 8—6·4 in., 6—3·9 in., 20 small.

See page 217.

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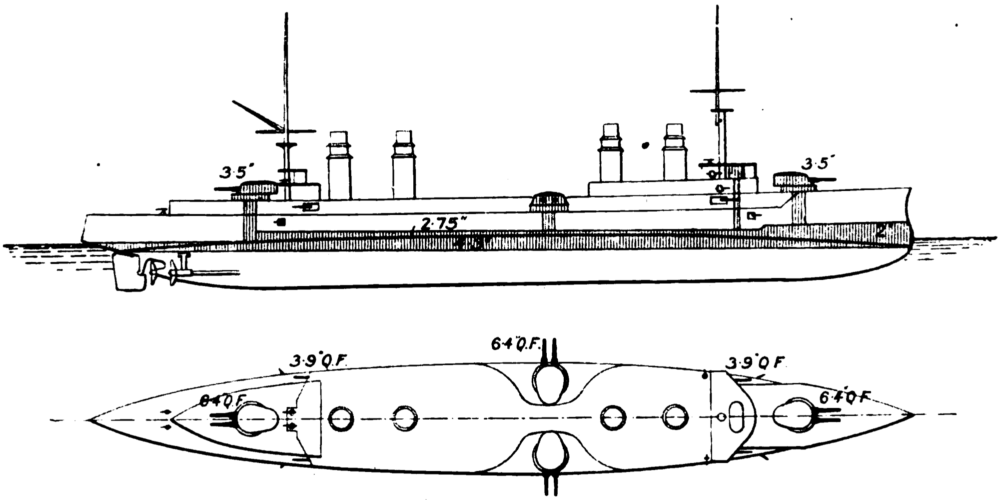
FRANCE,

ARMOURED CRUISERS.

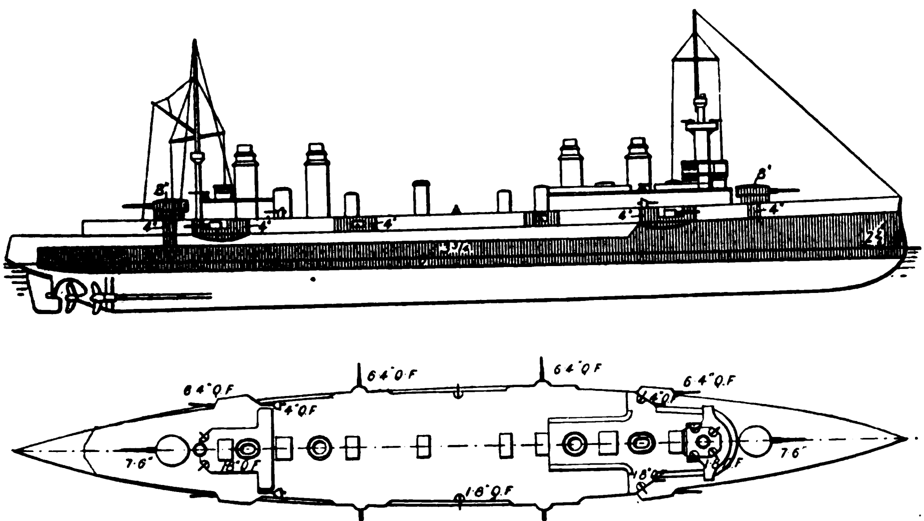
Kléber. Desaix. Dupleix.



Length, 426 ft. ; 7578 tons ; Speed, 21-21·7 knots ; Completed, 1903-1904 ;
Armament, 8—6·4 in., 4—3·9 in., 14 small.

See page 219.

Montcalm. Dupetit-Thouars. Gueydon.



Length, 453 ft. ; 9367 tons ; Speed, 21-22·5 knots ; Completed, 1902-1905 ;
Armament, 2—7·6 in., 8—6·4 in., 4—3·9 in.

See page 219.

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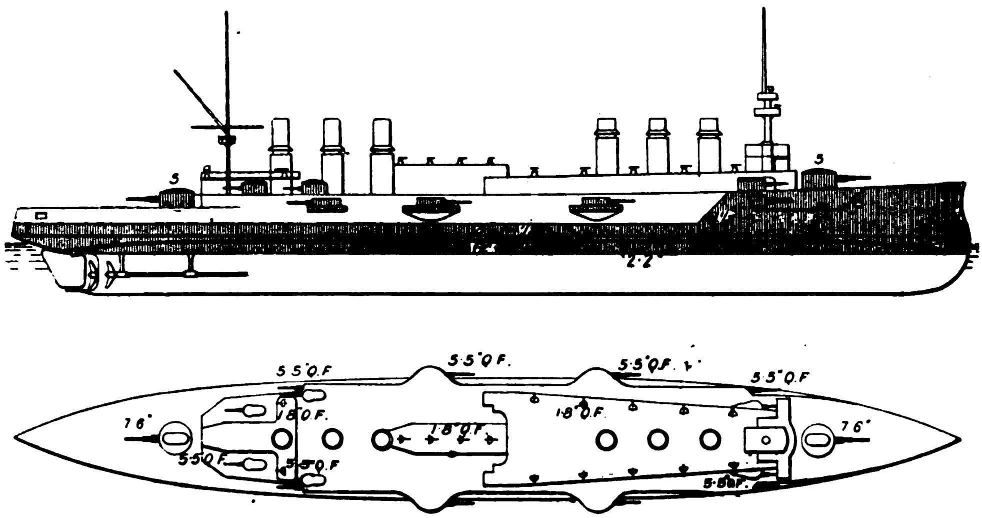
FRANCE.

ARMOURED CRUISER.

Jeanne d'Arc.

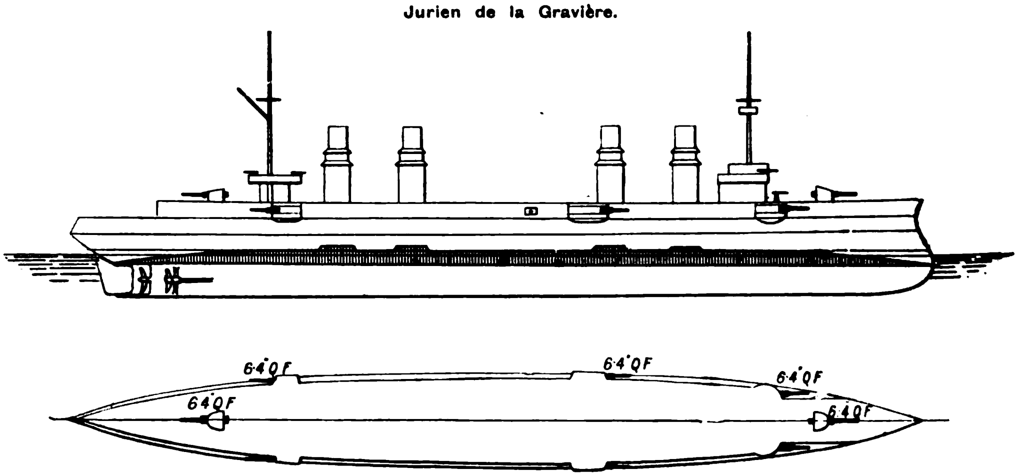


Length, 477 ft.; 11,092 tons; Speed, 21·7 knots; Completed, 1903;
Armament, 2—7·6 in., 14—5·5 in., 26 small.

See page 219.

CRUISER.

Jurien de la Gravière.



Length, 440 ft.; 5595 tons; Speed, 22·9 knots; Completed, 1901;
Armament, 8—6·4 in., 12 small.

See page 222.

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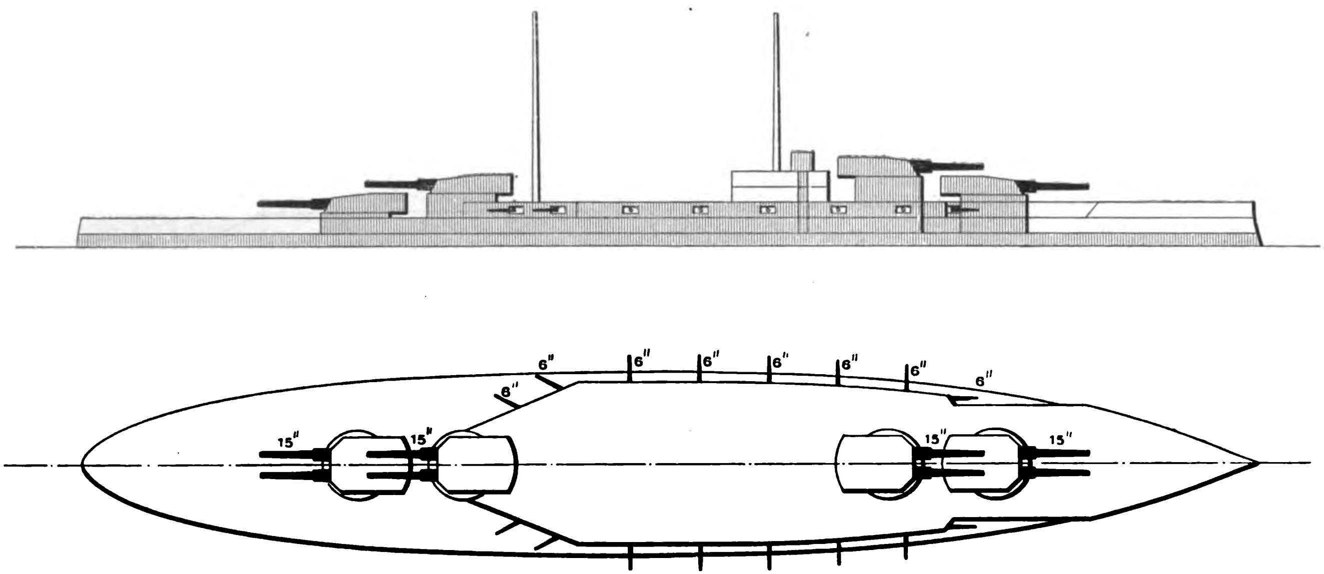
GERMANY.

BATTLESHIPS.

Ersatz Wörth. T.



28,000 tons ; Speed, 23 knots ; Building ;
Armament, 8—15 in., 16—6 in., and small.

See page 225.

PLATE 31.

d

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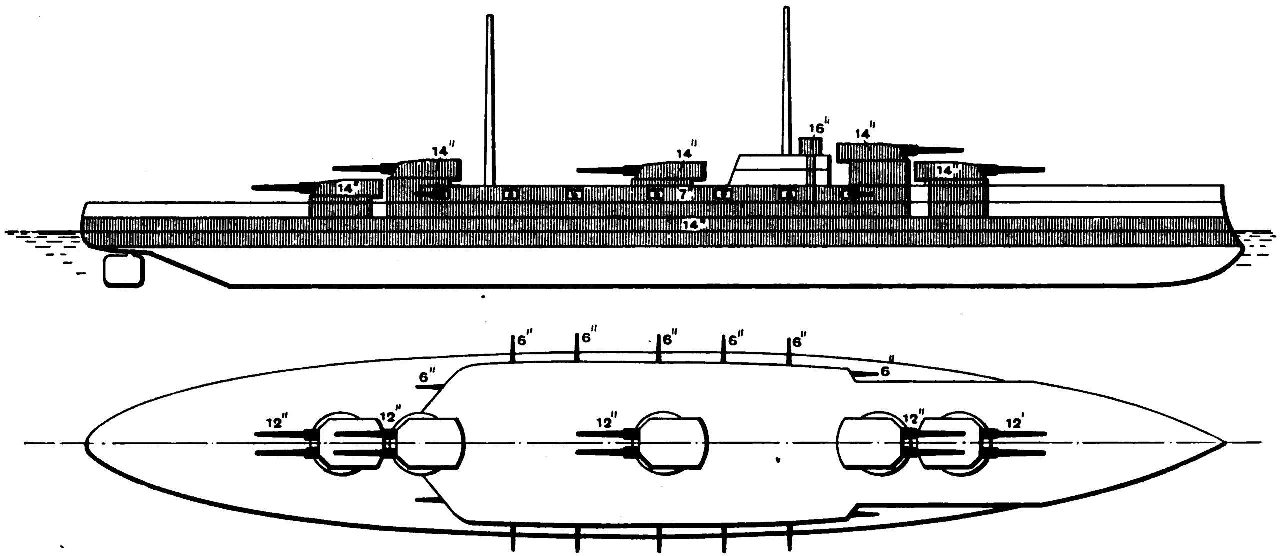
GERMANY.

BATTLESHIPS.

Konig. Grosser Kurfürst. Markgraf. Kronprinz.



Length, 580 ft.; 26,575 tons; Speed, 23 knots; Building;
Armament, 10—12 in., 14—6 in., 12—3·5 in.

See page 224.

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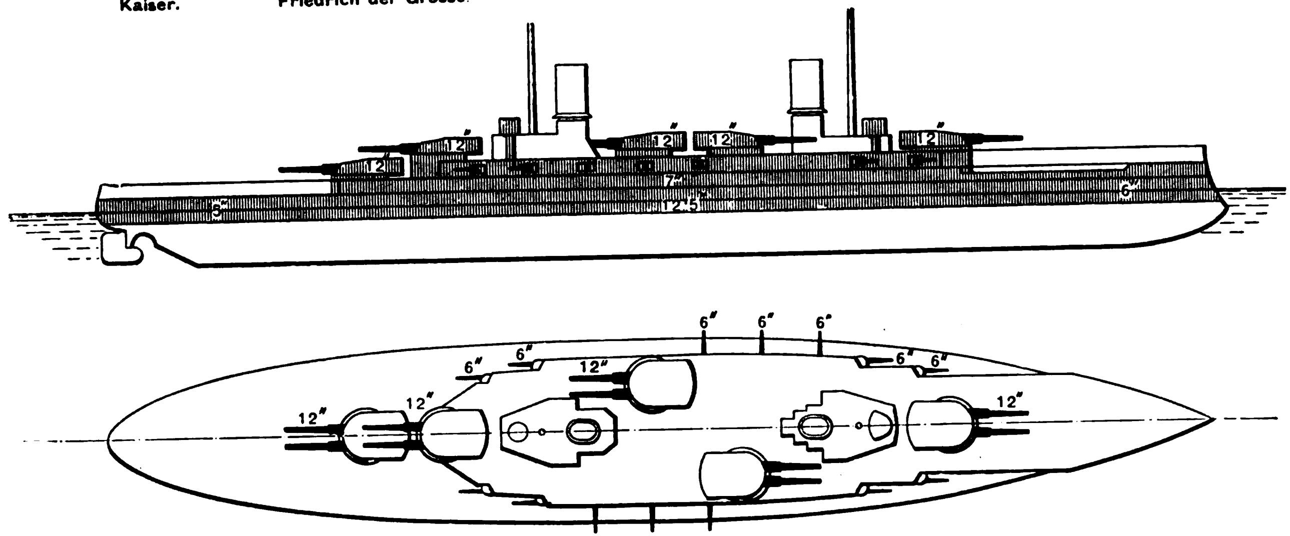
GERMANY.

BATTLESHIP.

Kaiser. Friedrich der Grosse. Kaiserin. Prinzregent Luitpold. König Albert.



Length, 564 ft.; 24,310 tons; Speed, 22·4 knots; Completed, 1912;
Armament, 10—12 in.; 14—6 in.; 12—3·4 in.

See page 223.

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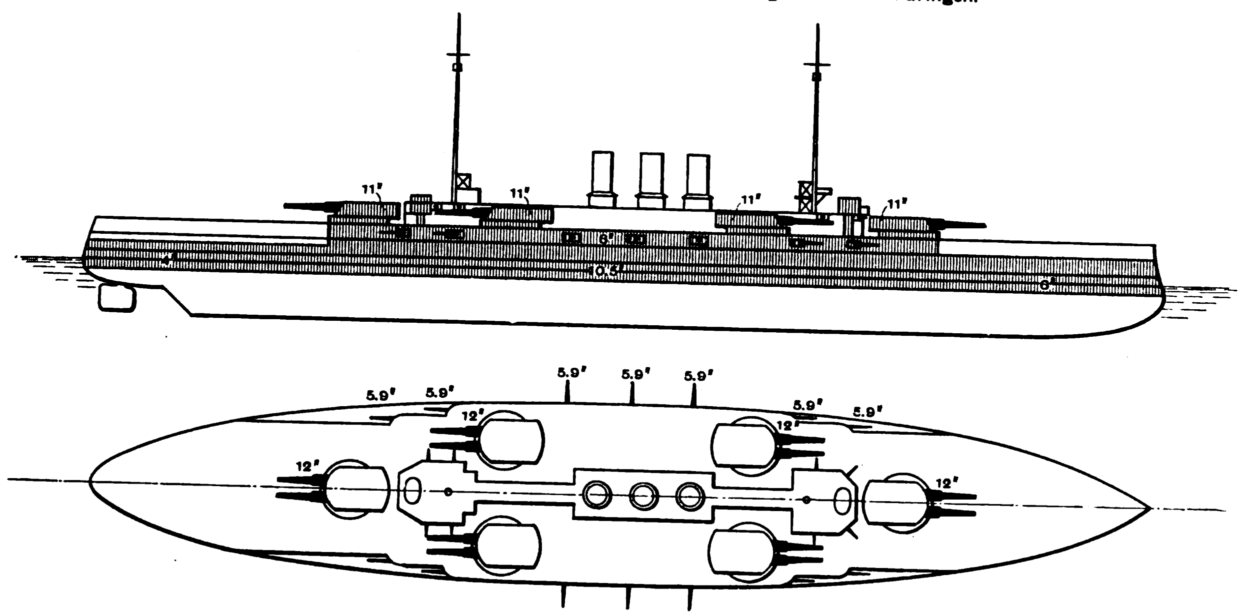
GERMANY.

BATTLESHIPS.

Ostfriesland. **Helgoland.** **Oldenburg.** **Thuringen.**



Length, 546 ft.; 22,500 tons; Speed, 20·5 knots; Completed, 1911-12; Armament, 12—12 in., 14—5·9 in., 14—3·4 in.

See page 225.

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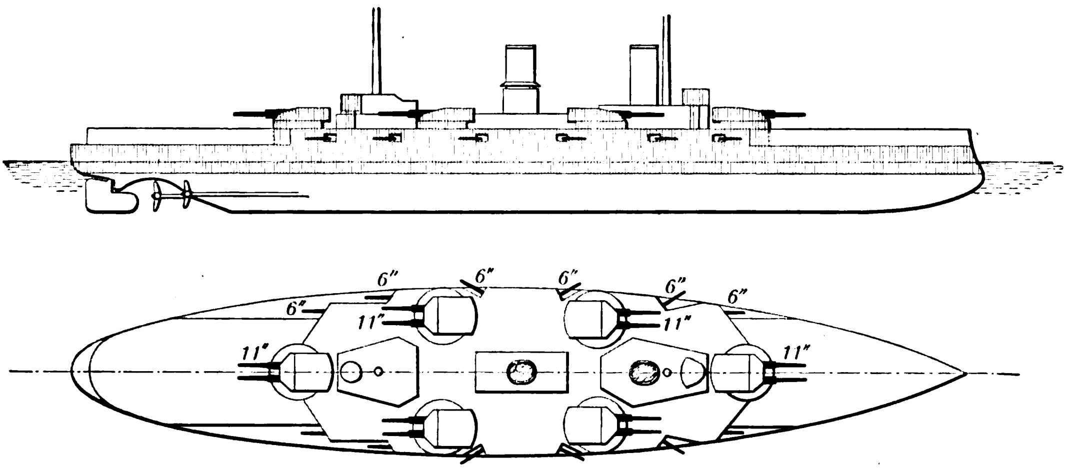
GERMANY.

BATTLESHIPS.

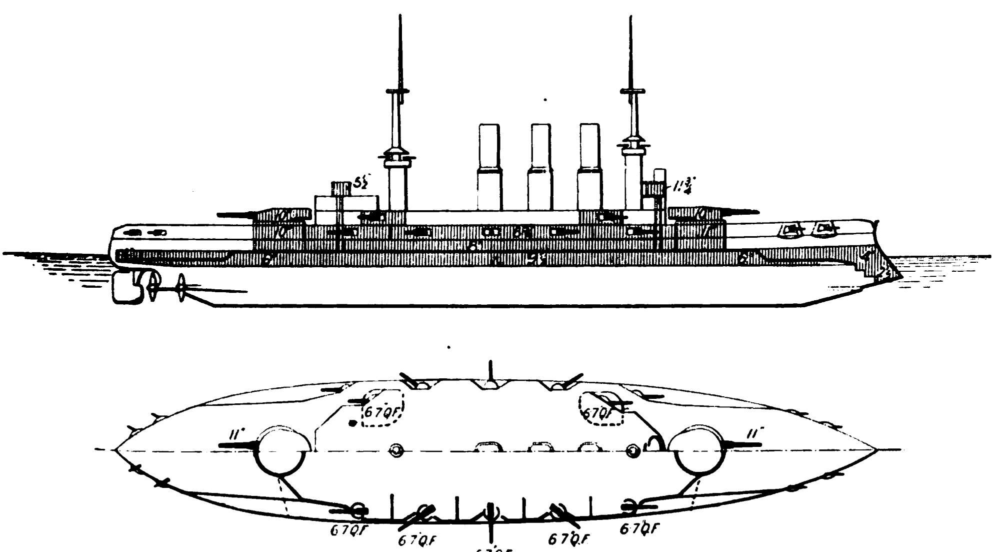
Nassau. **Posen.** **Rheinland.** **Westfalen.**



Length, 452 ft.; 18,600 tons; Speed, 20–20·7 knots; Completed, 1909–1910;
Armament, 12—11 in., 12—6 in., 16—3·4 in.

See page 224.

Deutschland. **Hannover.** **Pommern.** **Schlesien.** **Schleswig-Holstein.**



Length, 398 ft.; 13,040 tons; Speed, 18·5—19·5 knots; Completed, 1906–1908;
Armament, 4—11 in., 14—6·7 in., 22—3·4 in., 8 small.

See page 223.

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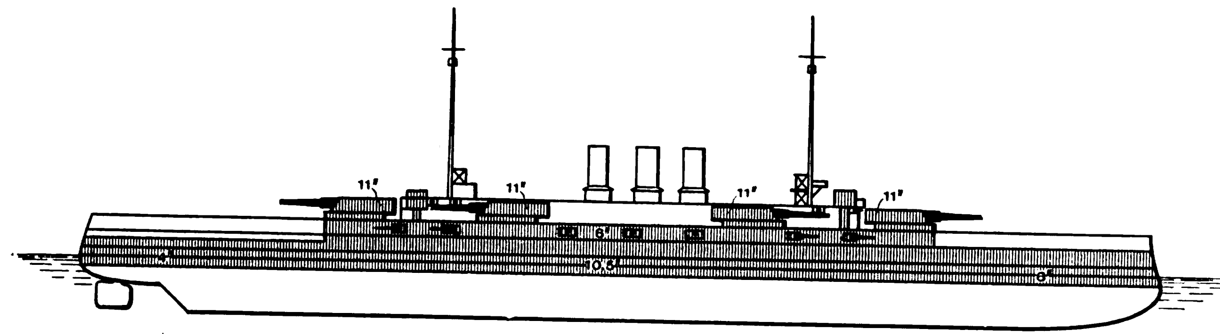
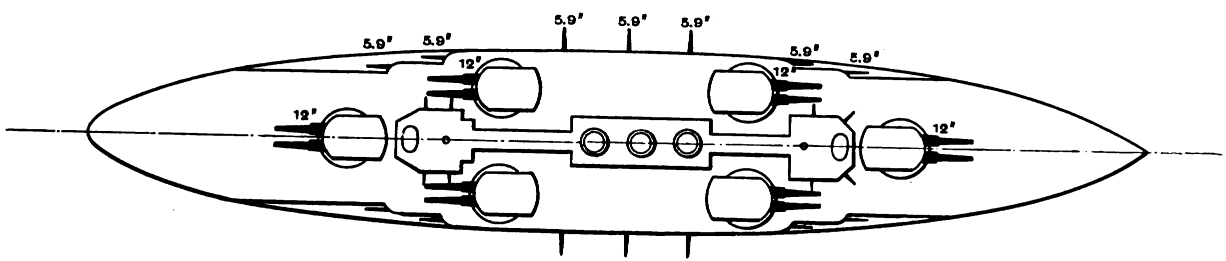
GERMANY.

BATTLESHIPS.

Ostfriesland. Helgoland. Oldenburg. Thuringen.





Length, 546 ft. ; 22,500 tons ; Speed, 20·5 knots ; Completed, 1911-12 ;
Armament, 12—12 in., 14—5·9 in., 14—3·4 in.

See page 225.

Plate 34.

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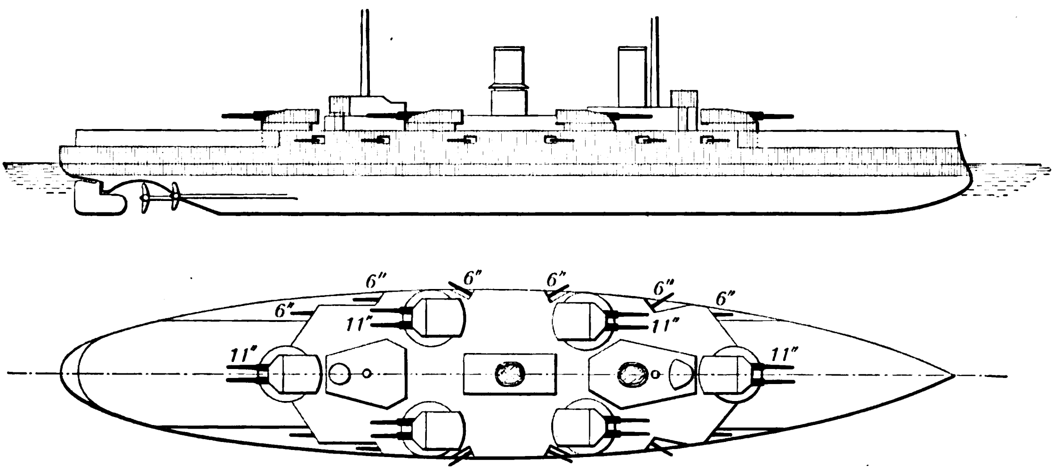
GERMANY.

BATTLESHIPS.

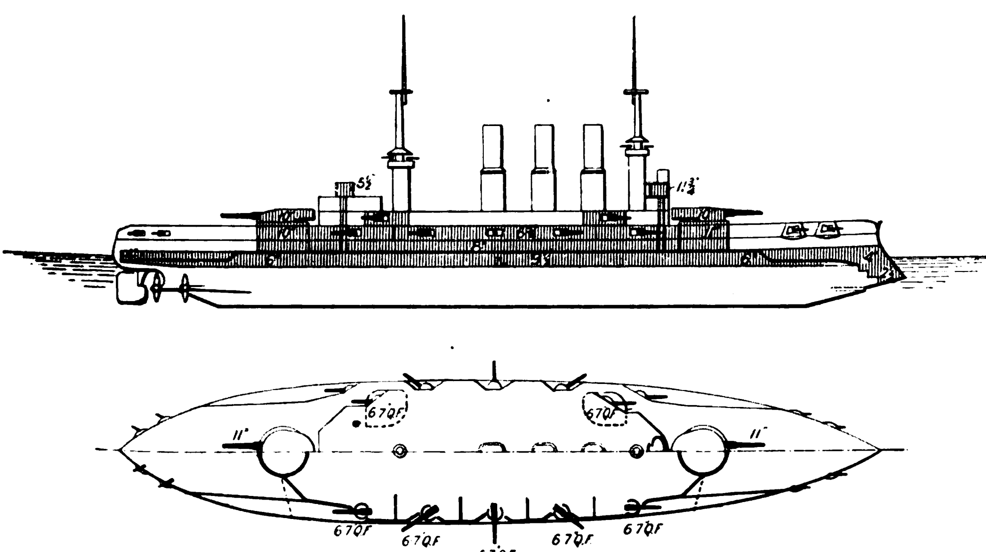
Nassau. **Posen.** **Rheinland.** **Westfalen.**



Length, 452 ft. ; 18,600 tons ; Speed, 20–20·7 knots ; Completed, 1909–1910 ;
Armament, 12—11 in., 12—6 in., 16—3·4 in.

See page 224.

Deutschland. **Hannover.** **Pommern.** **Schlesien.** **Schleswig-Holstein.**



Length, 398 ft. ; 13,040 tons ; Speed, 18·5—19·5 knots ; Completed, 1906–1908 ;
Armament, 4—11 in., 14—6·7 in., 22—3·4 in., 8 small.

See page 223.

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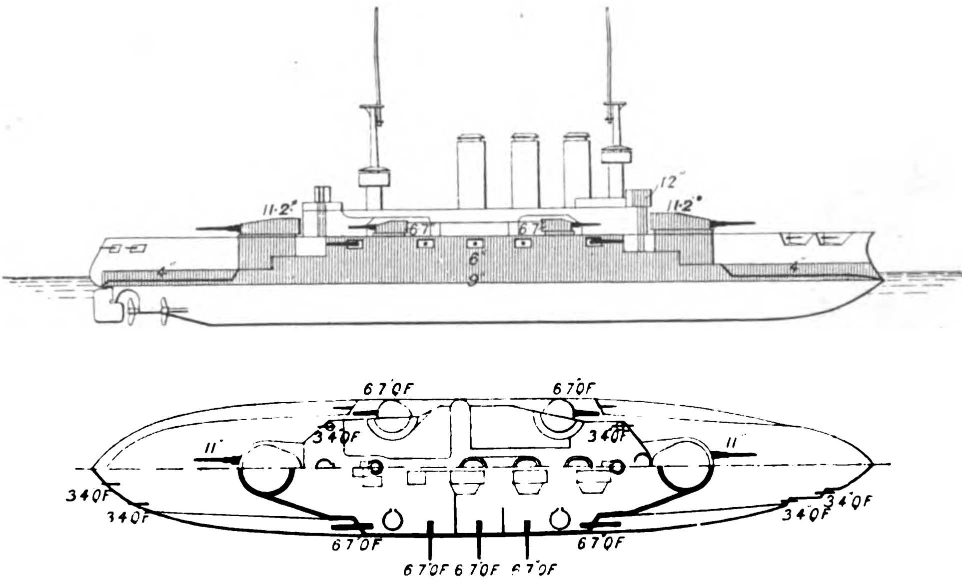
GERMANY.

BATTLESHIPS.

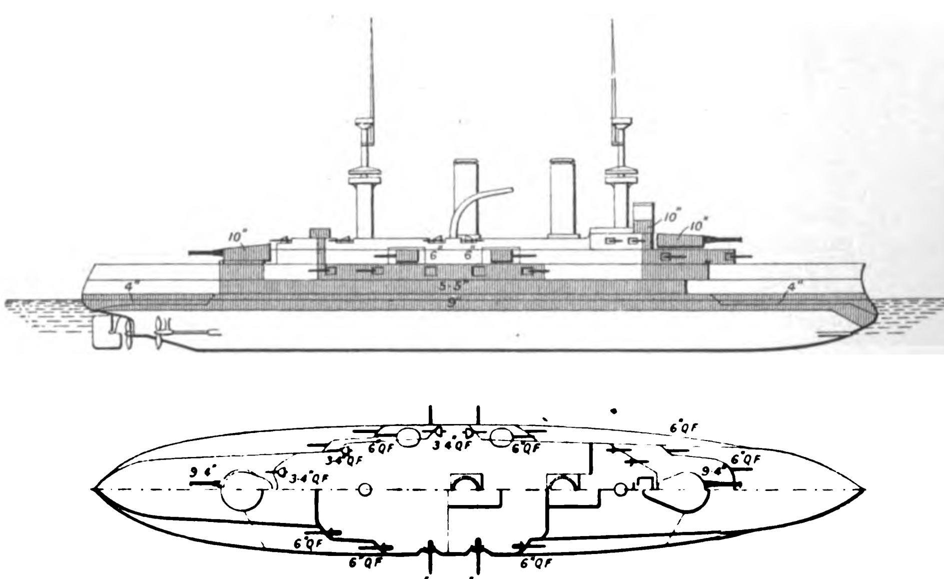
Braunschweig. **Elsass.** **Hessen.** **Lothringen.** **Preussen.**



Length, 398 ft. ; 12,997 tons ; Speed, 18—18·7 knots ; Completed, 1904-1906 ;
Armament, 4—11 in., 14—6·7 in., 18—3·4 in., and small.

See page 223.

Wittelsbach. **Mecklenburg.** **Schwaben.** **Wettin.** **Zähringen.**



Length, 394 ft. ; 11,611 tons ; Speed, 18—19 knots ; Completed, 1902-1903 ;
Armament, 4—9·4 in., 18—6 in., 12—3·4 in., 20 small.

See page 225.

Plate 36.

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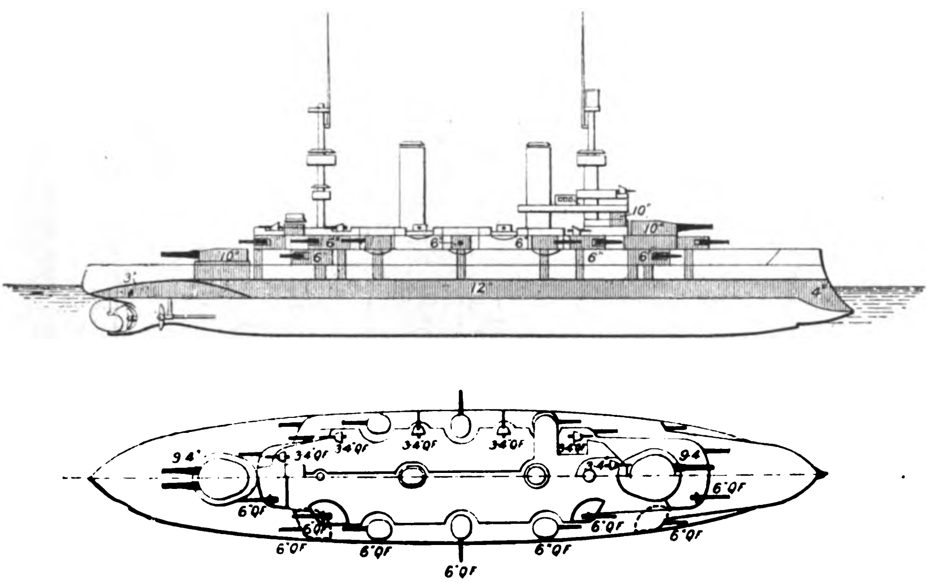
BATTLESHIPS.

Kaiser Friedrich III. Kaiser Karl der Grosse. Kaiser Wilhelm II. Kaiser Wilhelm der Grosse. Kaiser Barbarossa.



Length, 377 ft. ; 10,474 tons ; Speed, 18 knots ; Completed, 1898-1901 ;
Armament, 4—9·4 in., 18—6 in., 12—3·4 in., 20 small.
Note.—Superstructure has been cut down.

See page 224.

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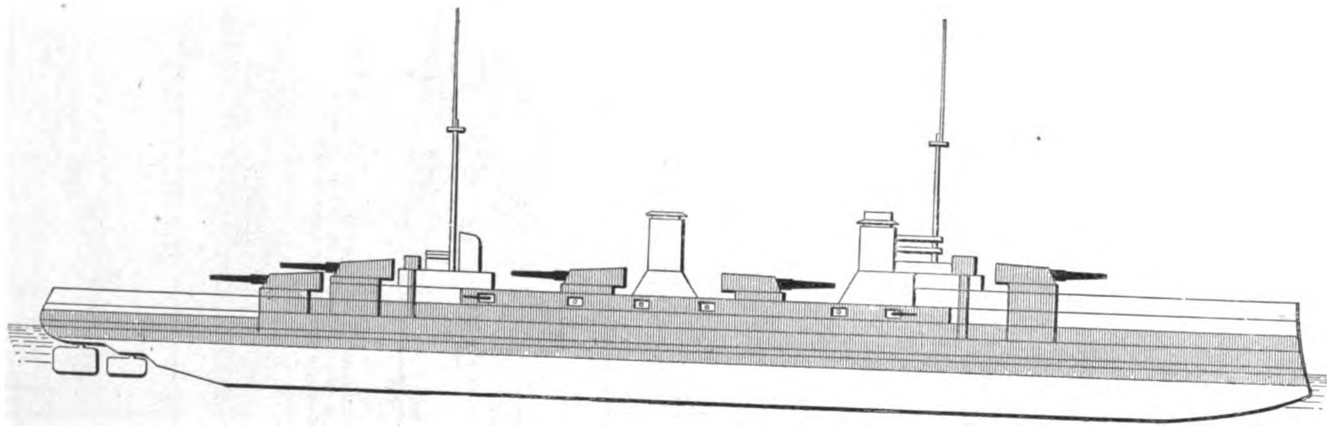
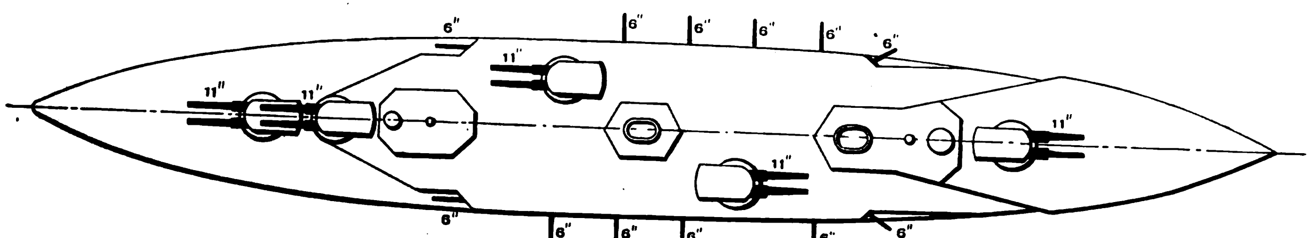
GERMANY.

BATTLE CRUISER.

Seydlitz.





Length, 656 ft.; 24,640 tons; Speed, 29·2 knots; Completed, 1913; Armament, 10—11 in., 12—6 in., 12—3·5 in.

See page 225.

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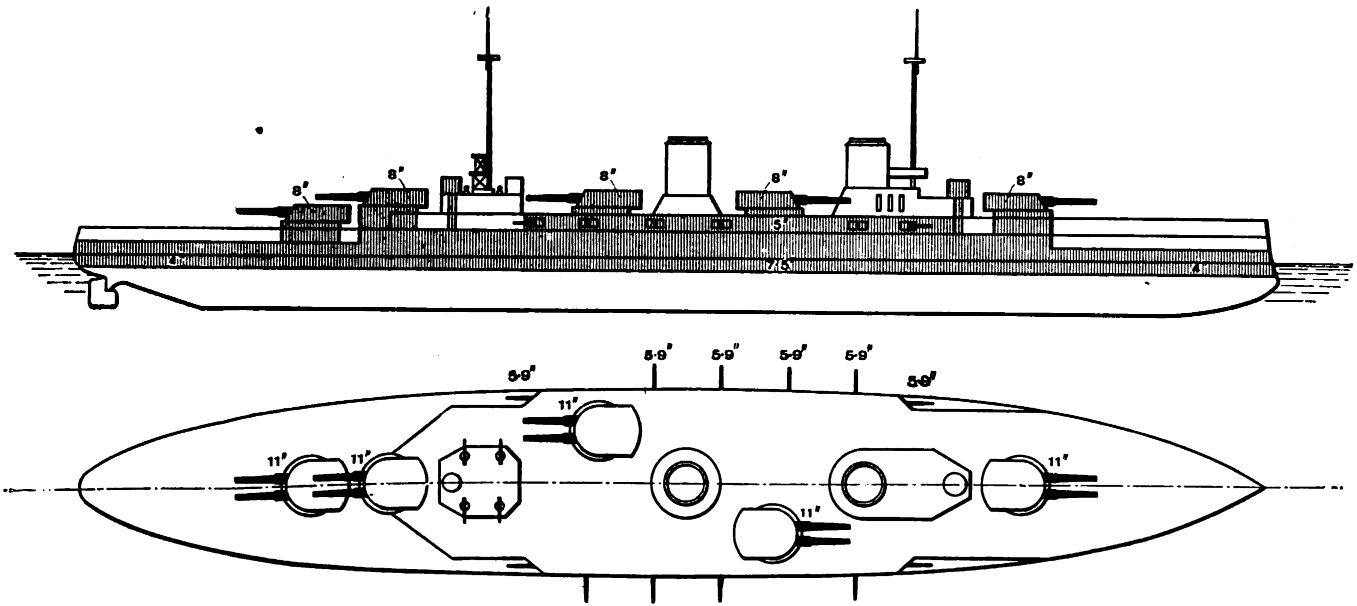
GERMANY.

BATTLE CRUISERS.

Moltke. **Goeben.**



Length, 610 ft. ; 22,640 tons ; Speed, 28·5 knots ; Completed, 1911-12 ;
Armament, 10—11 in., 12—5·9 in., 12—3·4 in.

See page 224.

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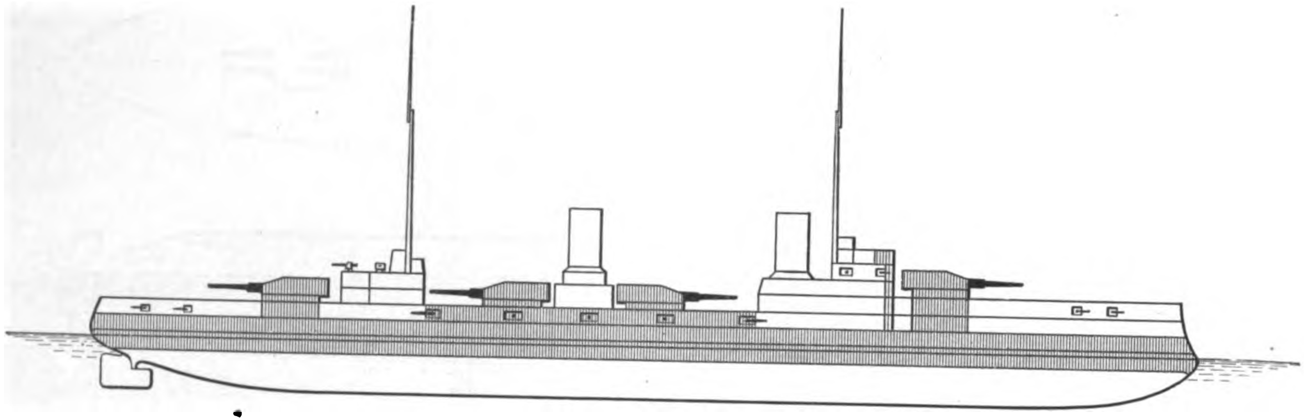
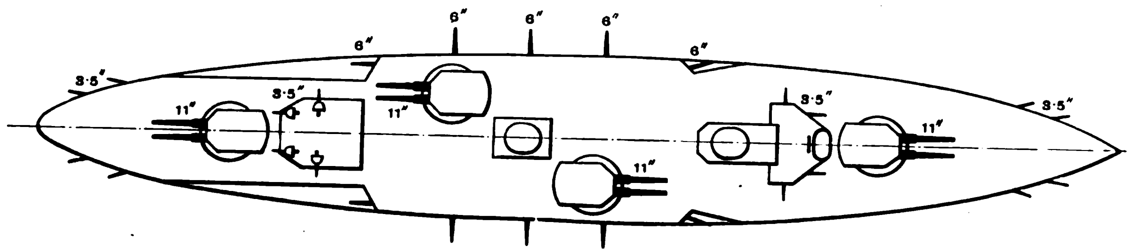
GERMANY.

BATTLE CRUISER.

Von der Tann.





Length, 561 ft.; 18,700 tons; Speed, 27·6 knots; Completed, 1911;
Armament, 8—11 in., 10—6 in., 16—3·5 in.

See page 225.

PLATE 40.

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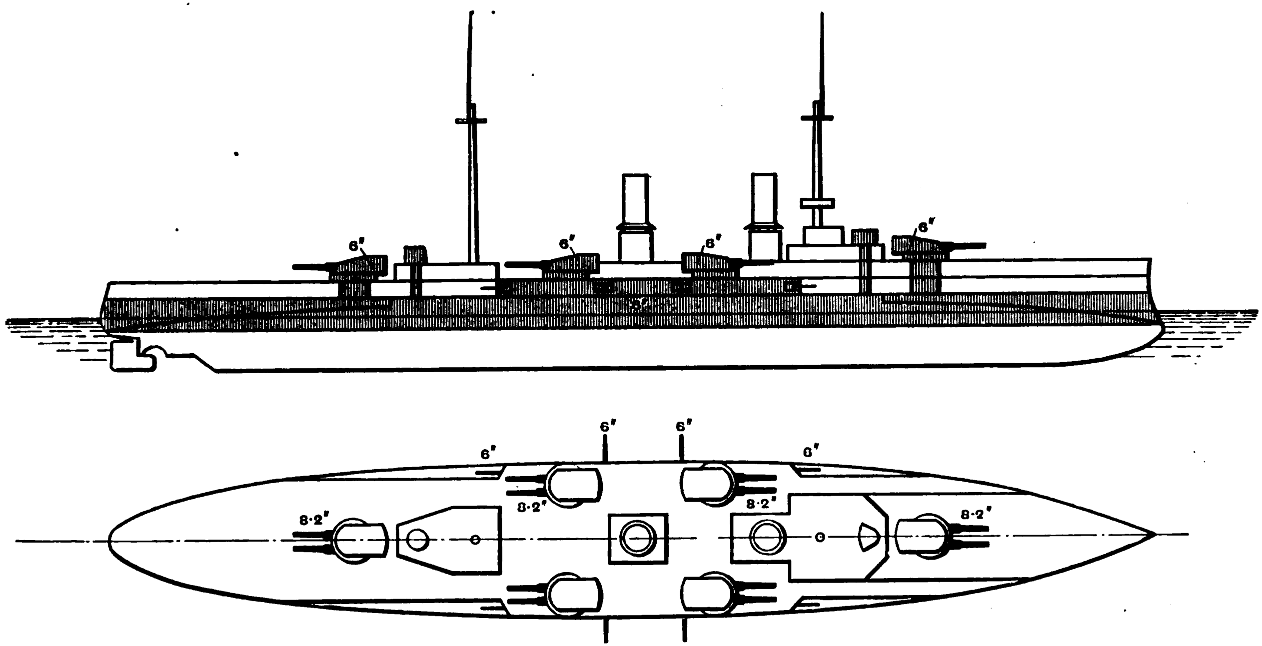
GERMANY.

ARMOURED CRUISER.

Blücher.



Length, 499 ft. ; 15,550 tons ; speed 25·3 knots ; Completed 1910 ;
Armament, 12—8·2 in. ; 8—6 in. ; 16—3·4 in.

See page 223.

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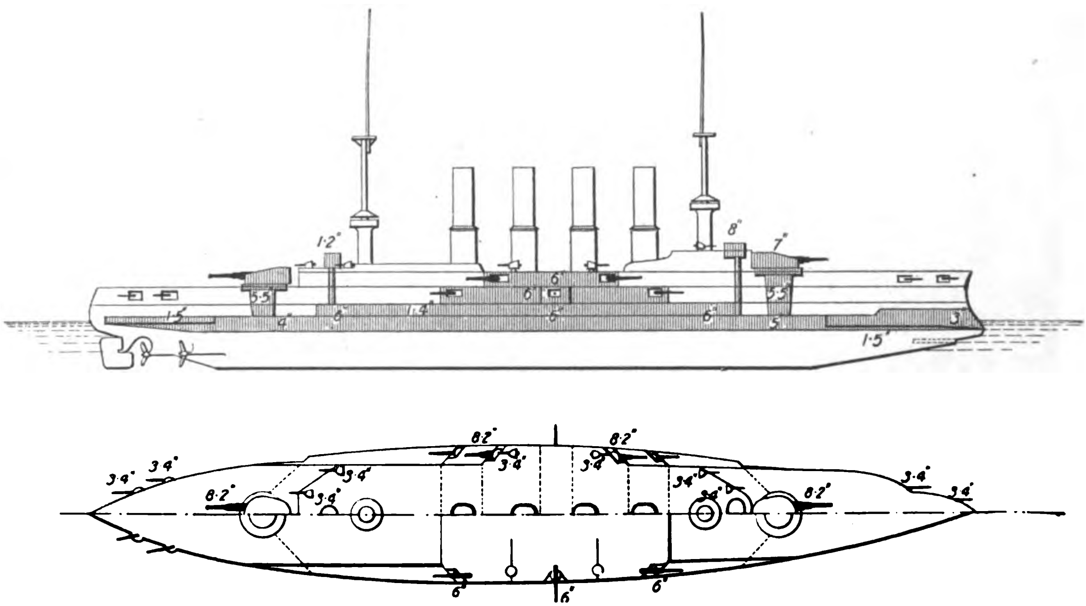
GERMANY.

ARMOURED CRUISERS.

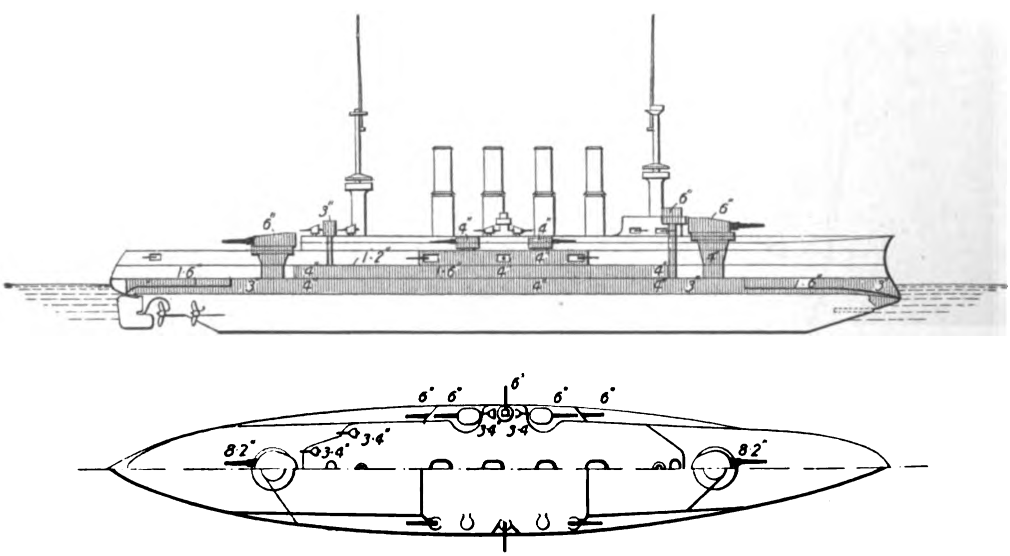
Gneisenau. **Scharnhorst.**



Length, 450 ft. ; 11,420 tons ; Speed, 22·5—23·8 knots ; Completed, 1908 ;
Armament, 8—8·2 in., 6—6 in., 20—3·4 in., 14 small.

See page 223.

Roon. **Yorck.**



Length, 403 ft. ; 9350 tons ; Speed, 21·1 knots ; Completed, 1905 ;
Armament, 4—8·2 in., 10—6 in., 14—3·4 in., 3 small.

See page 225.

PLATE 42.

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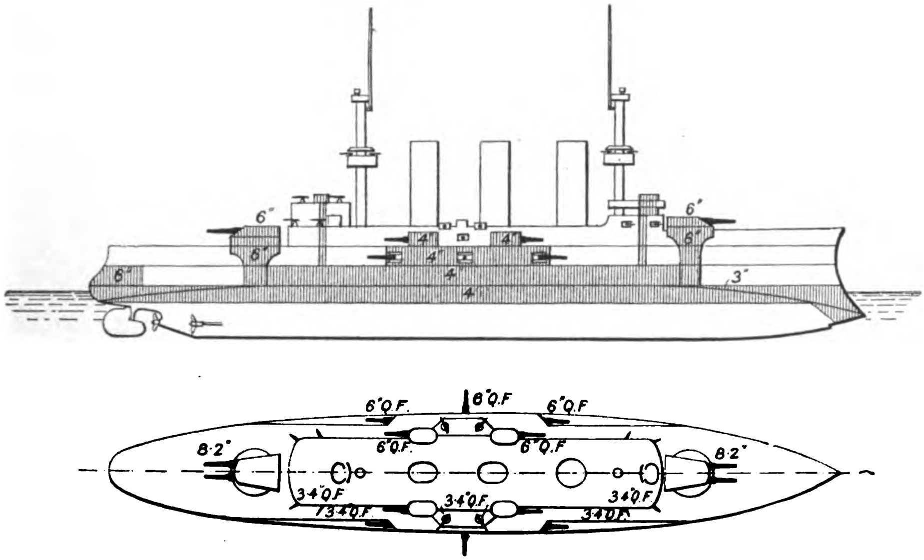
GERMANY.

ARMOURED CRUISERS.

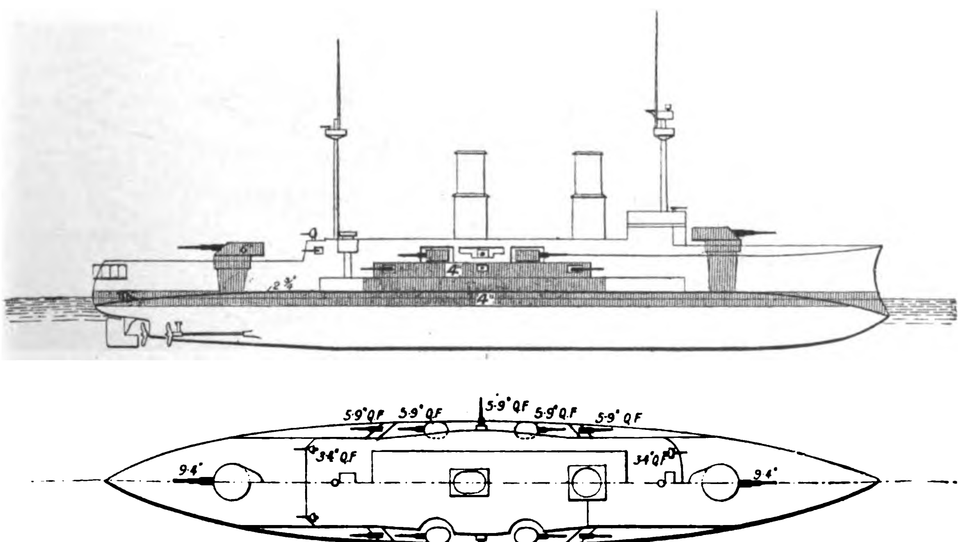
Prinz Adalbert. **Friedrich Karl.**



**Length, 393 ft. ; 8858 tons ; Speed, 20·3—20·5 knots ; Completed, 1903–1904 ;
Armament, 4—8·2 in., 10—6 in., 12—3·4 in., 3 small.**

See page 225.

Prinz Heinrich.



**Length, 396 ft. ; 8759 tons ; Speed, 20 knots ; Completed, 1902
Armament, 2—9·4 in., 10—5·9 in., 10—3·4 in., 7 small.**

See page 225.

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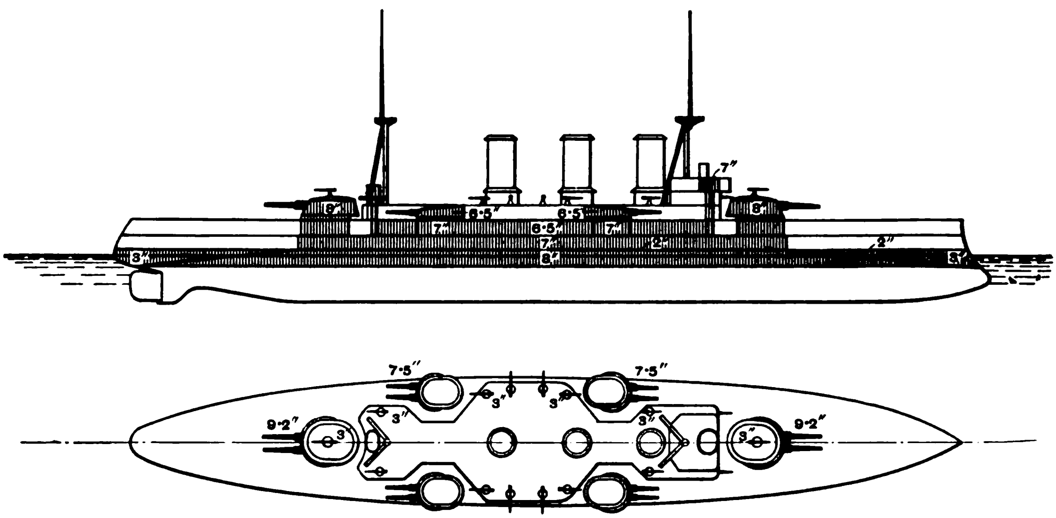
GREECE.

ARMOURED CRUISER.

Giorgios Averoff.



Length, 430 ft. ; 9956 tons ; Speed, 24 knots ; Completed, 1911 ;
Armament, 4—9·2 in., 8—7·5 in., 16—3 in., 8 small.

See page 230.

PLATE 44.

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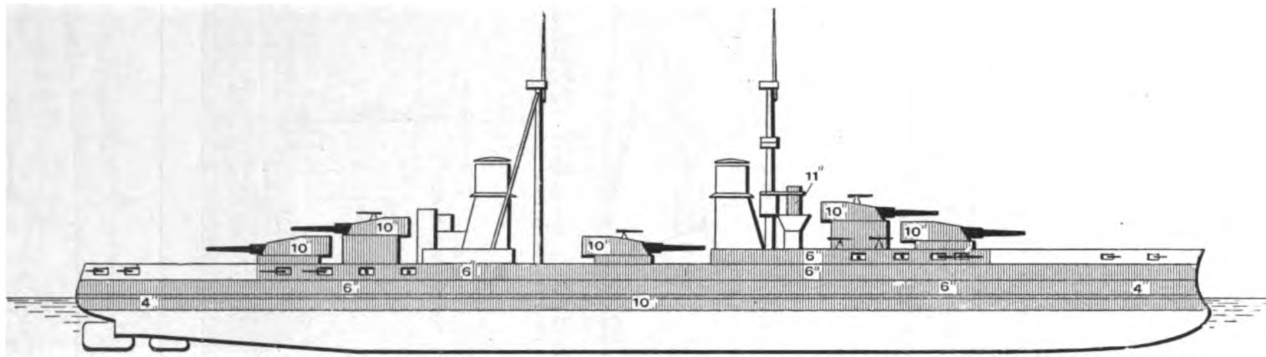
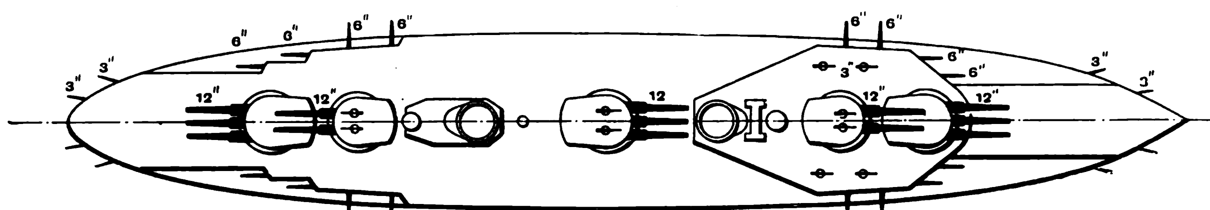
ITALY.

BATTLESHIPS.

Andrea Doria. **Duilio.**





Length, 570 ft. ; 23,025 tons ; Speed, 23 knots ; Building ;
Armament, 13—12 in., 16—6 in., 14—12 pr., 6 small.

See page 231.

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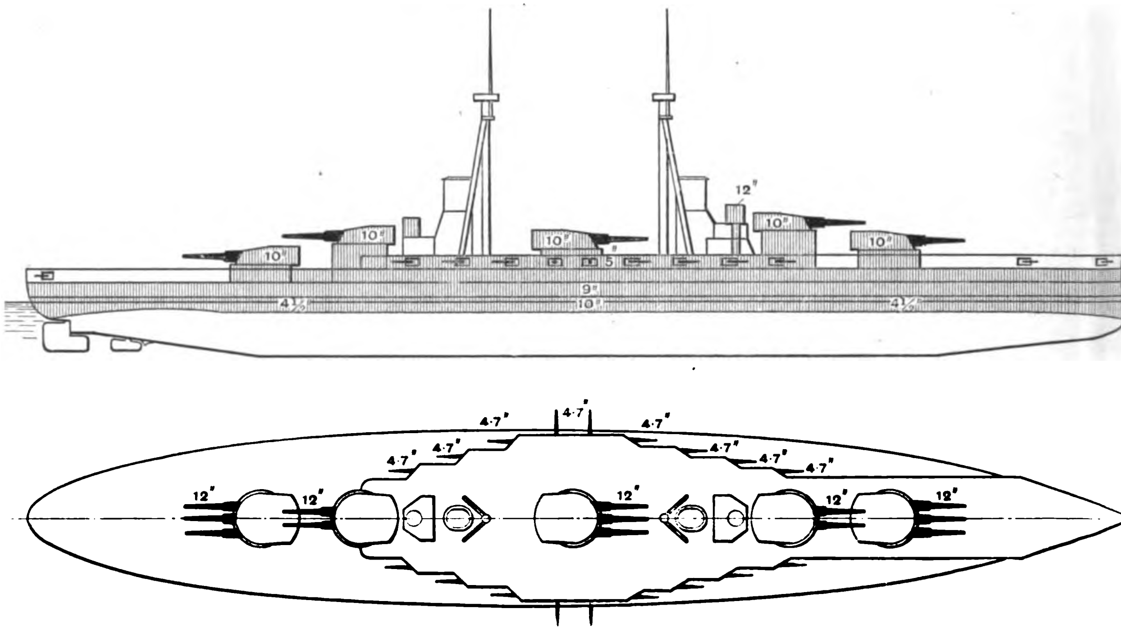
BATTLESHIPS.

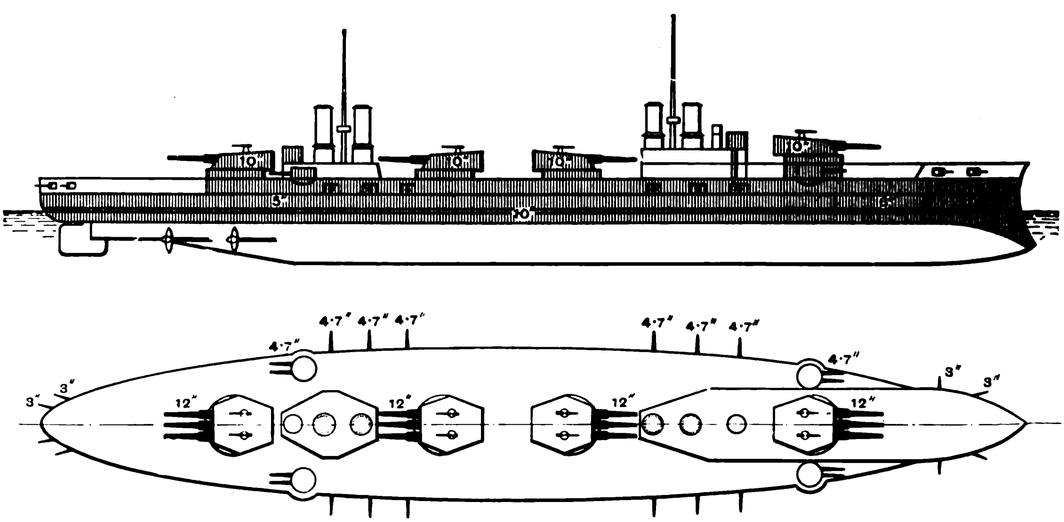
Conte di Cavour. Giulio Cesare. Leonardo da Vinci.



Length, 557 ft. ; 22,340 tons ; Speed, 22·5-23 knots ; 1914—Building ;
Armament, 13—12 in., 18—4·7 in., 14—12 pr.

See page 231.

Dante Alighieri.



Length, 505 ft. ; 19,400 tons ; Speed, 23·8 knots ; Completed, 1912 ;
Armament, 12—12 in., 20—4·7 in., and small.

See page 231.

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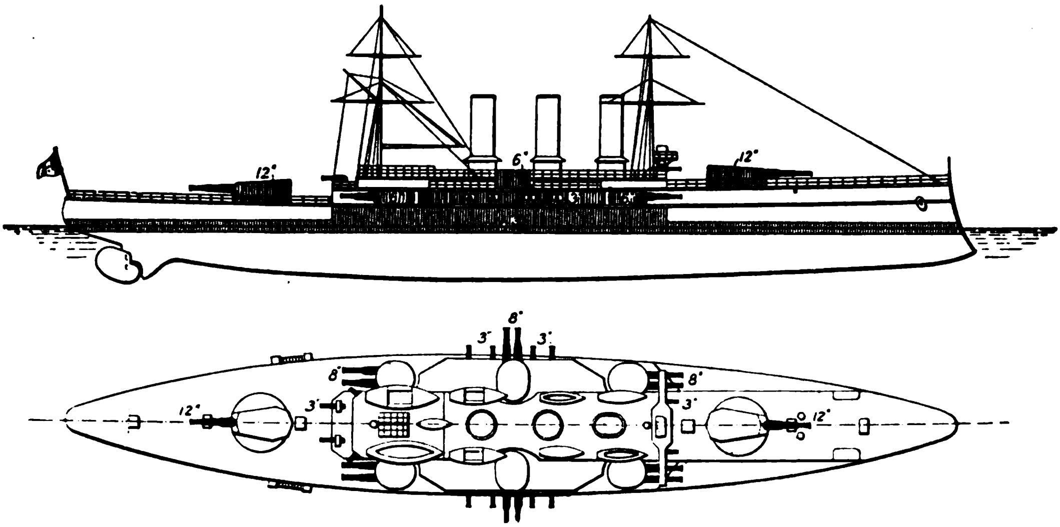
ITALY.

BATTLESHIPS.

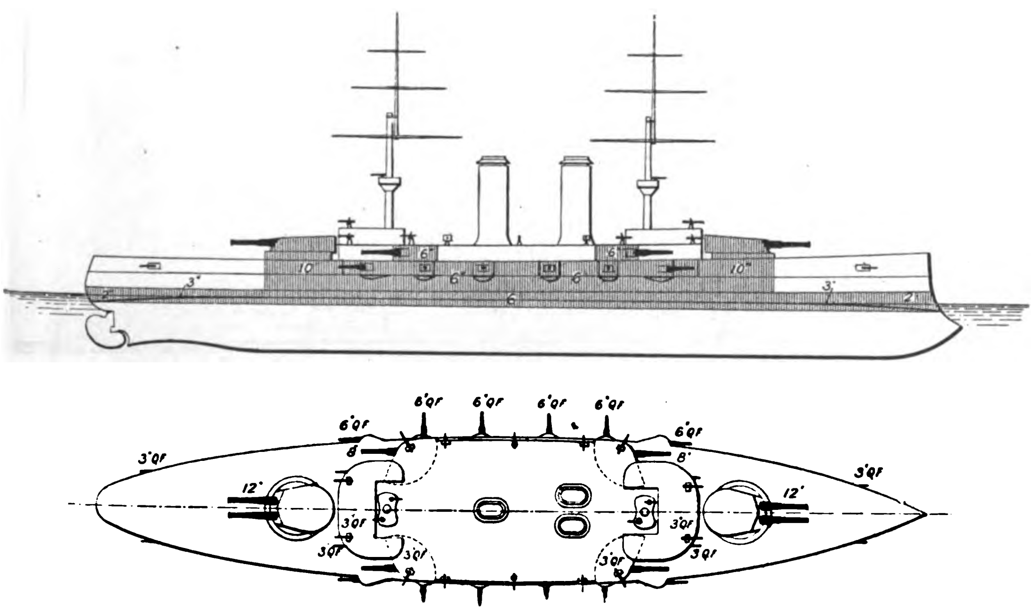
Vittorio Emanuele. **Napoli.** **Regina Elena.** **Roma.**



Length, 435 ft. ; 12,425 tons ; Speed, 22 knots ; Completed, 1907—1909 ;
Armament, 2—12 in., 12—8 in., 12—3 in., 12 small.

See page 232.

Benedetto Brin. **Regina Margherita.**



Length, 426 ft. ; 13,214 tons ; Speed, 19·5–20·2 knots ; Completed, 1904—1905 ;
Armament, 4—12 in., 4—8 in., 12—6 in., 16—3 in., 10 small.

See page 231.

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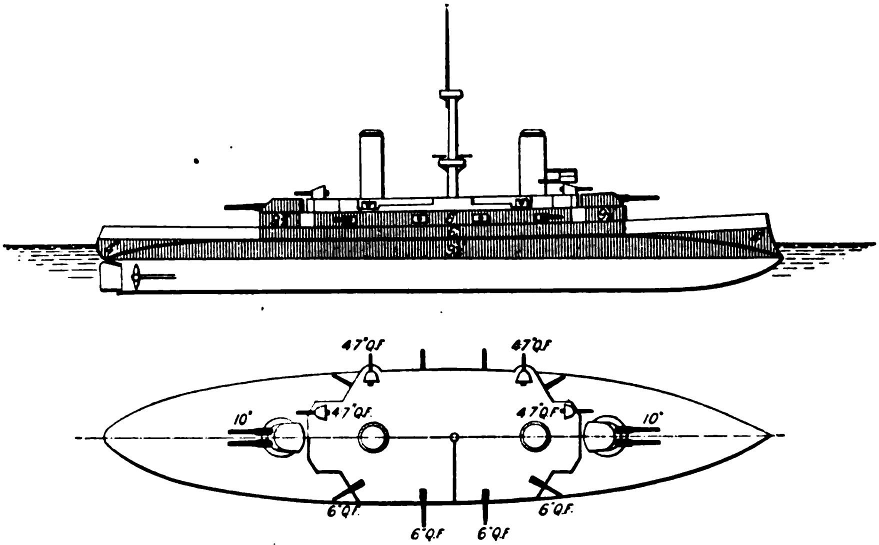
ITALY.

BATTLESHIPS.

Ammiraglio di St. Bon. **Emanuele Filiberto.**

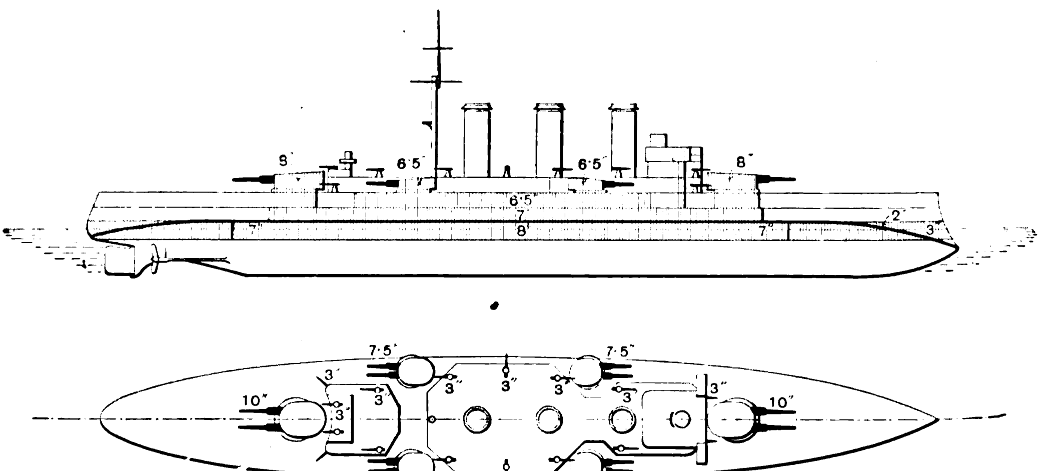


Length, 344 ft. ; 9645 tons ; Speed, 18·3 knots ; Completed, 1901-1902 ;
Armament, 4—10 in., 8—6 in., 8—4·7 in., 2—2·9 in., 8 small

See page 231.

ARMOURED CRUISERS.

Amalfi. **Pisa.**



Length, 430 ft. ; 9956 tons ; Speed, 23 knots ; Completed, 1909 ;
Armament, 4—10 in., 8—7·5 in., 16—3 in., 2 small.

See page 231.

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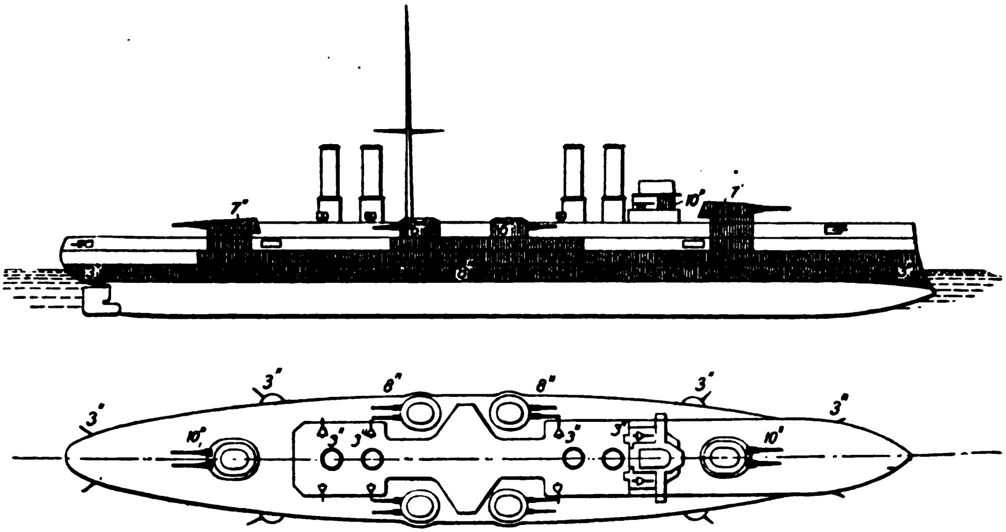
ARMOURED CRUISERS.

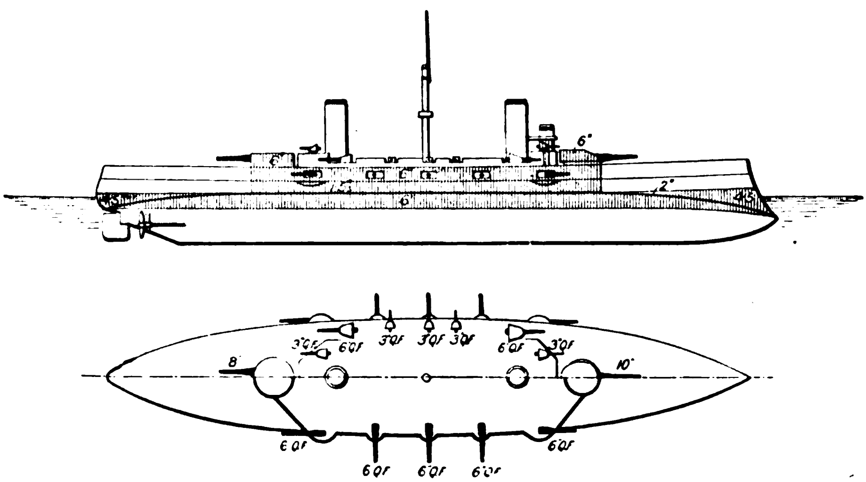
S. Giorgio. S. Marco.



Length, 430 ft. ; 9832 tons ; Speed, 22·5 knots ; Completed, 1910 ;
Armament, 4—10 in., 8—8 in., 16—3 in., 8 small.

See page 232.

Francesco Ferruccio. Giuseppe Garibaldi. Varese.



Length, 344 ft. ; 7294 tons ; Speed, 20 knots ; Completed, 1901-1904 ;
Armament, 1—10 in., 2—8 in., 14—6 in., 10—3 in., 8 small.

See page 231.

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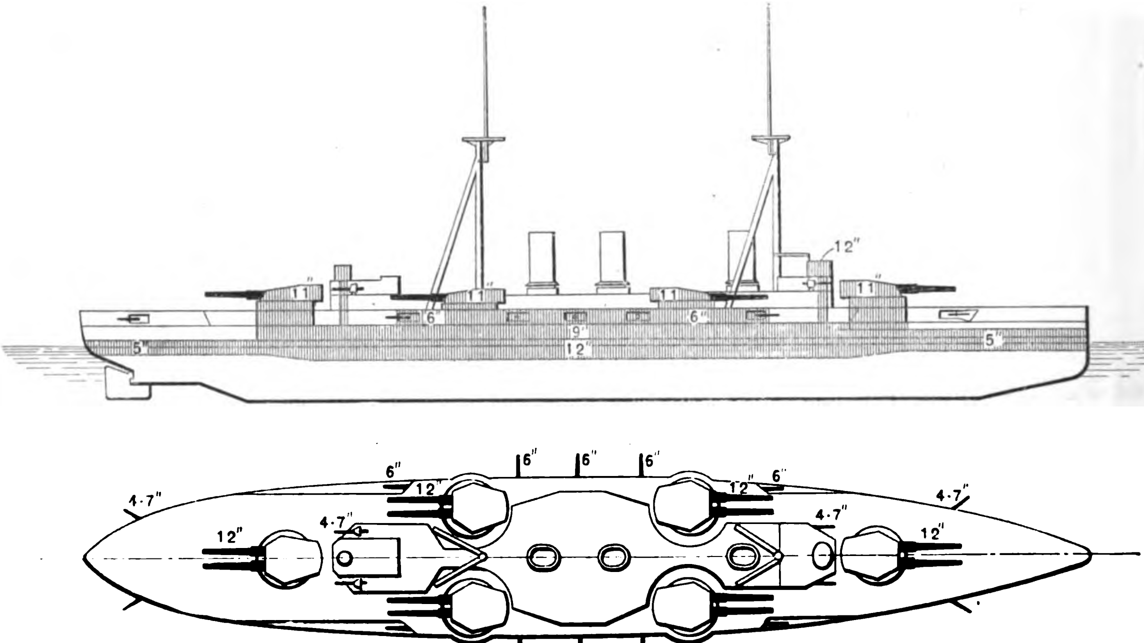
JAPAN.

BATTLESHIPS.

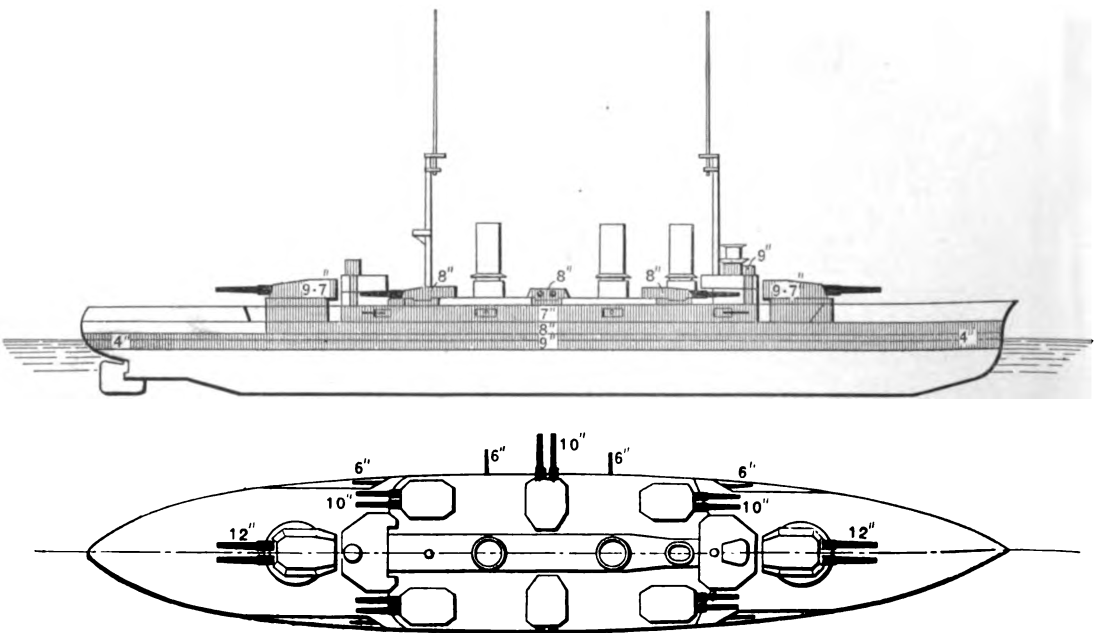
Kawachi. **Settsu.**



Length, 500 ft. ; 21,420 tons ; Speed, 20·5 knots ; Completed, 1912 ;
Armament, 12—12 in., 10—6 in., 8—4·7 in., 16 small.

See page 236.

Aki.



Length, 400 ft. ; 19,800 tons ; Speed, 20·5 knots ; Completed, 1911 ;
Armament, 4—12 in., 12—10 in., 8—6 in.,8—12 pr., 8 small.

See page 235.

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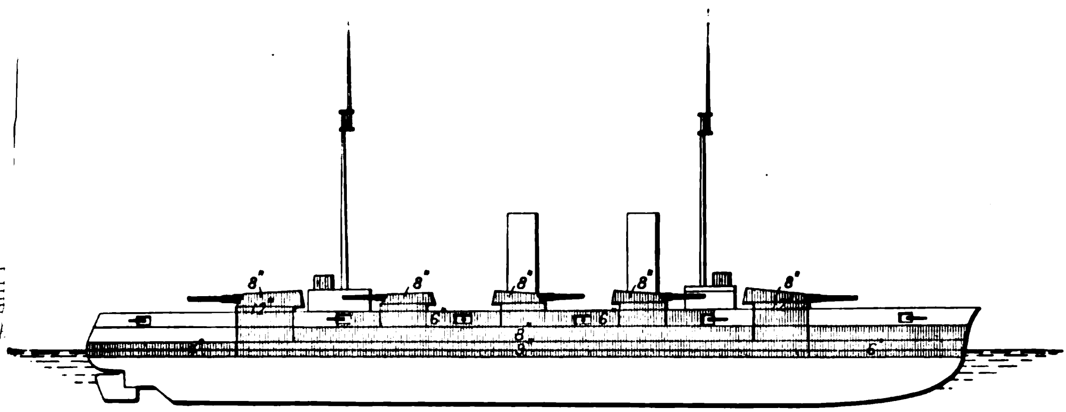
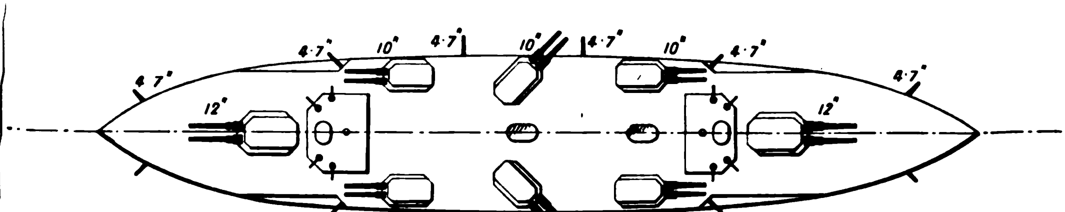
BATTLESHIPS.

Satsuma.

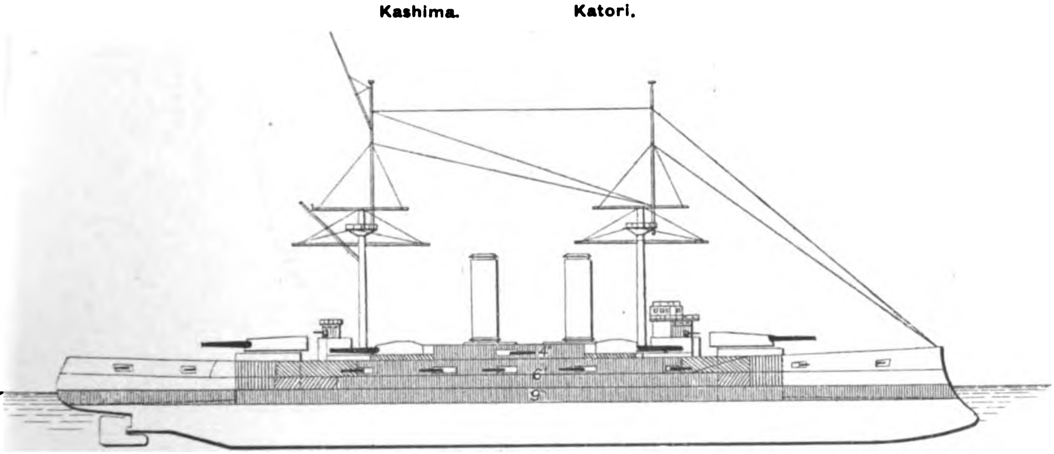


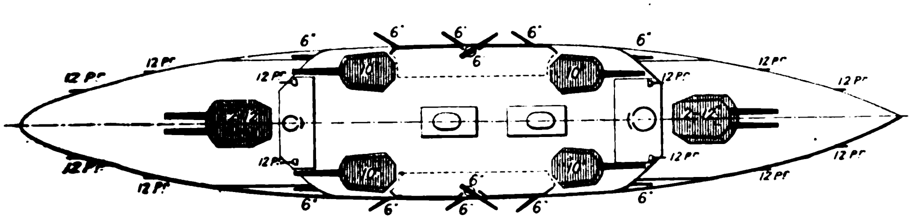


Length, 450 ft. ; 19,350 tons ; Speed, 18·5 knots ; Completed, 1910 ;
Armament, 4—12 in., 12—10 in., 12—4·7 in., 4—12 pr., 8 small.

See page 237.

Kashima. Katori.





Length, 420–425 ft. ; 15,950–16,400 tons ; Speed, 19·5 knots ; Completed, 1906 ;
Armament, 4—12 in., 4—10 in., 12—6 in., 12—12 pr., 11 small.

See page 236.

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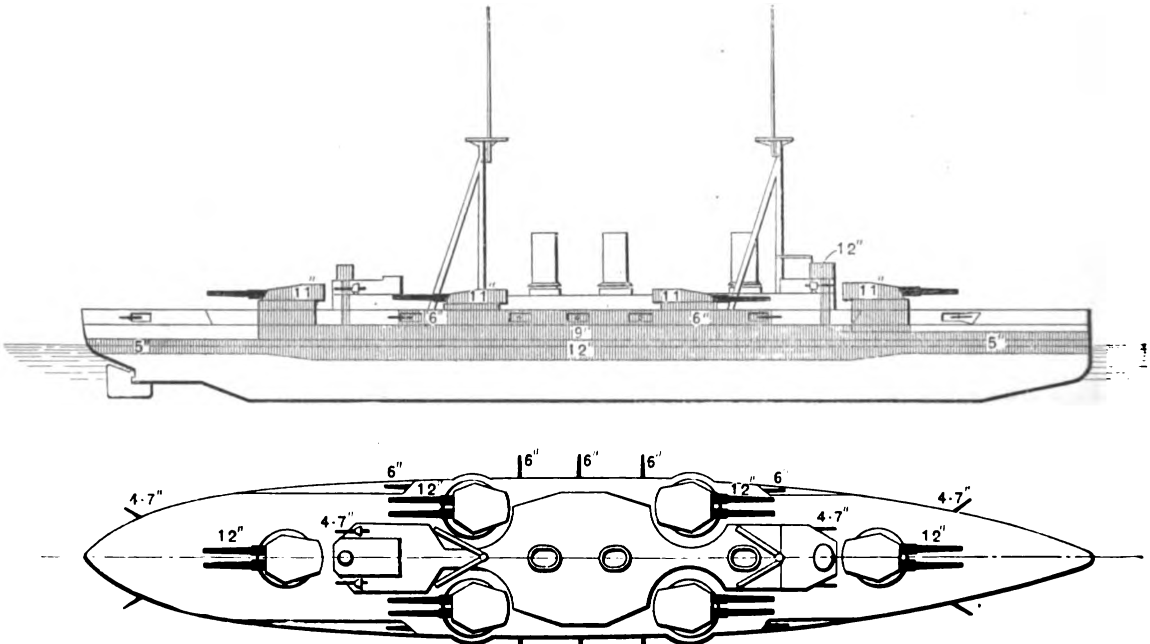
JAPAN.

BATTLESHIPS.

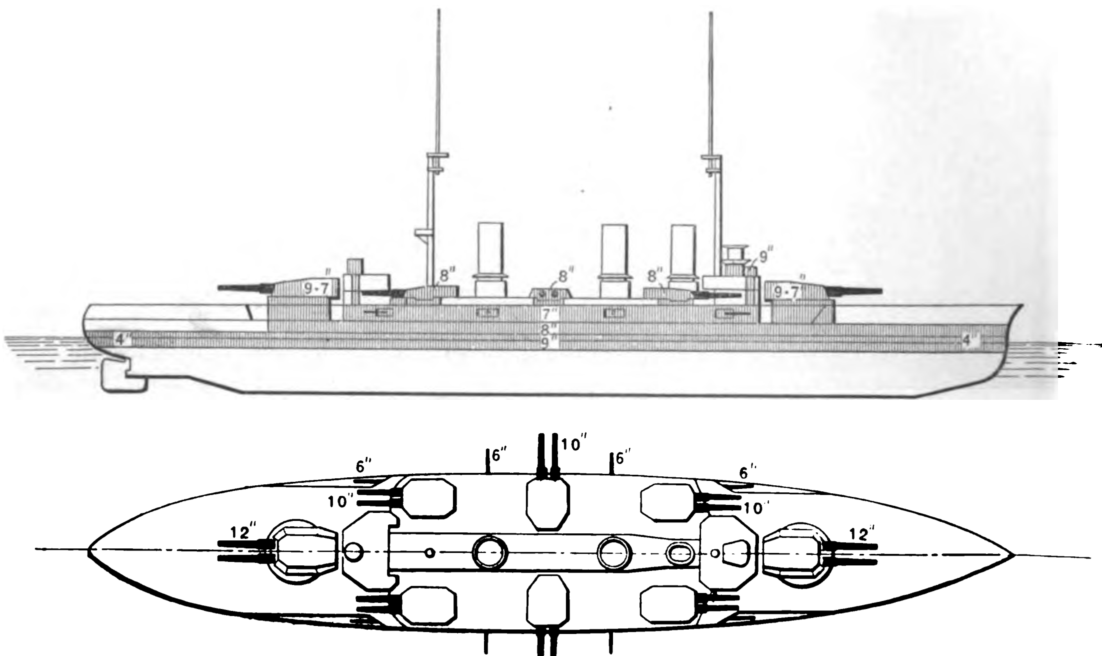
Kawachi. **Settsu.**



Length, 500 ft. ; 21,420 tons ; Speed, 20·5 knots ; Completed, 1912 ;
Armament, 12—12 in., 10—6 in., 8—4·7 in., 16 small.

See page 236.

Aki.



Length, 400 ft. ; 19,800 tons ; Speed, 20·5 knots ; Completed, 1911 ;
Armament, 4—12 in., 12—10 in., 8—6 in.,8—12 pr., 8 small.

See page 235.

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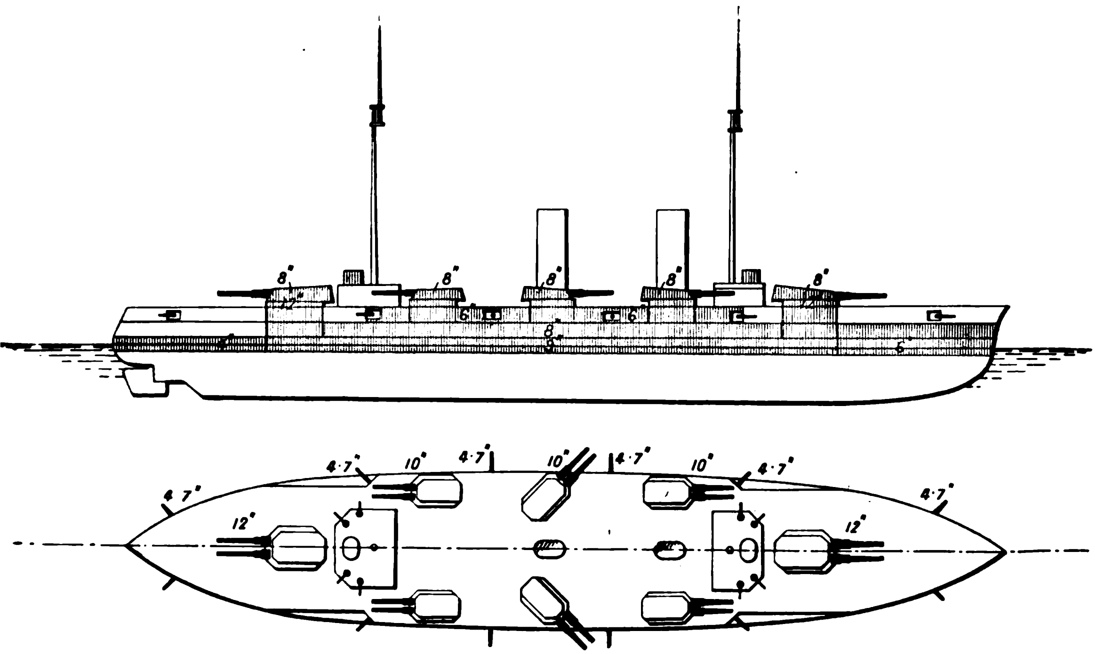
JAPAN.

BATTLESHIPS.

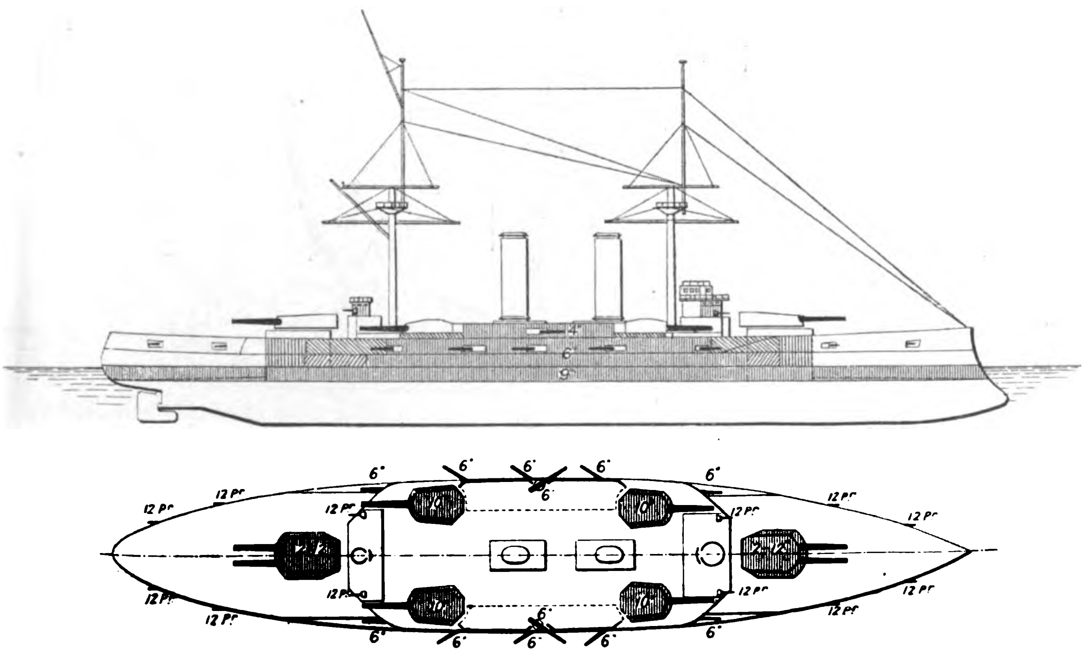
Satsuma.



Length, 450 ft. ; 19,350 tons ; Speed, 18·5 knots ; Completed, 1910 ;
Armament, 4—12 in., 12—10 in., 12—4·7 in., 4—12 pr., 8 small.

See page 237.

Kashima. Katori.



Length, 420–425 ft. ; 15,950–16,400 tons ; Speed, 19·5 knots ; Completed, 1906 ;
Armament, 4—12 in., 4—10 in., 12—6 in., 12—12 pr., 11 small.

See page 236.

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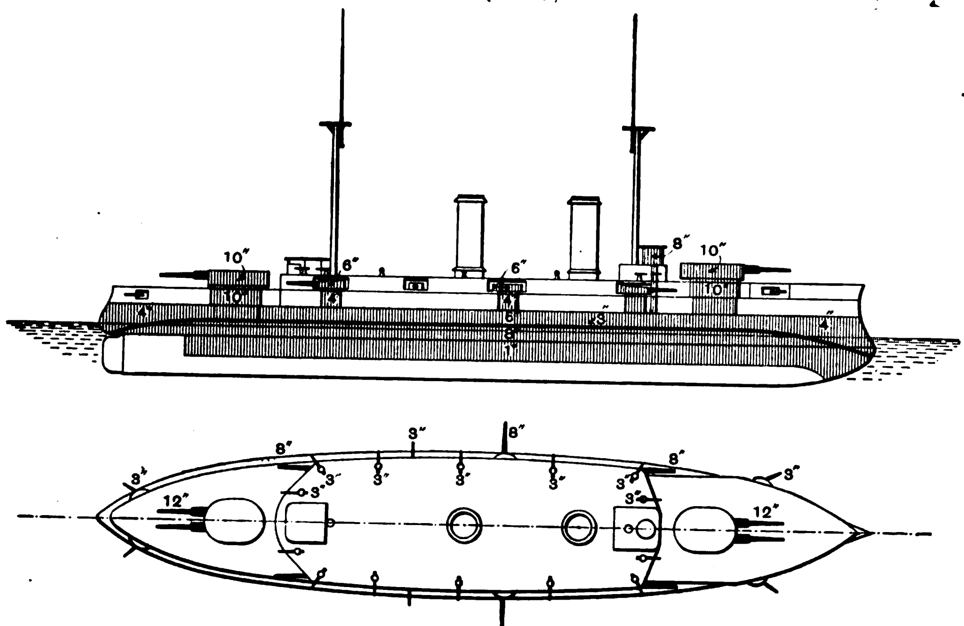
JAPAN.

BATTLESHIP.

Iwami (*ex* Orel).



Length, 368 ft.; 13,516 tons; Speed, 18 knots; Completed, 1904; Armament, 4—12 in., 6—8 in., 24—3 in., and small.

See page 236.

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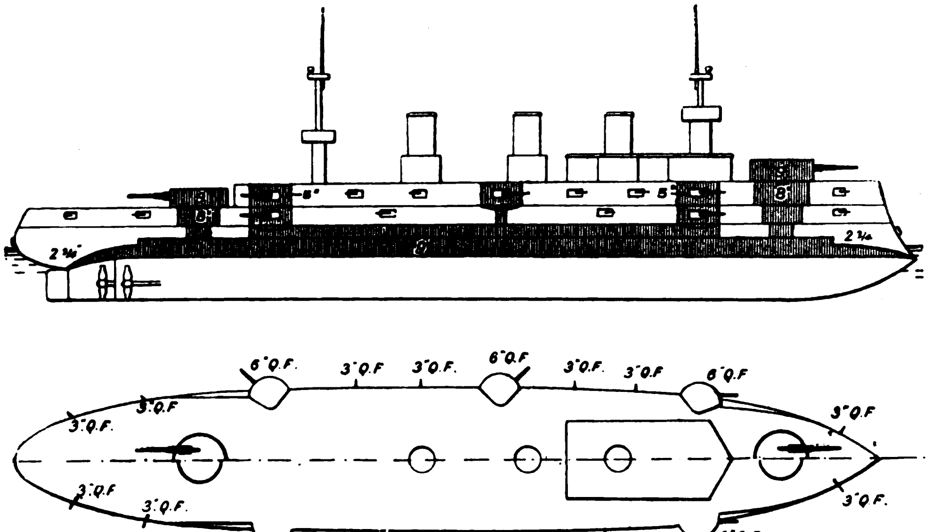
JAPAN.

BATTLESHIPS.

Sagami *late* **Peresviet.** **Suo** *late* **Pobieda.**

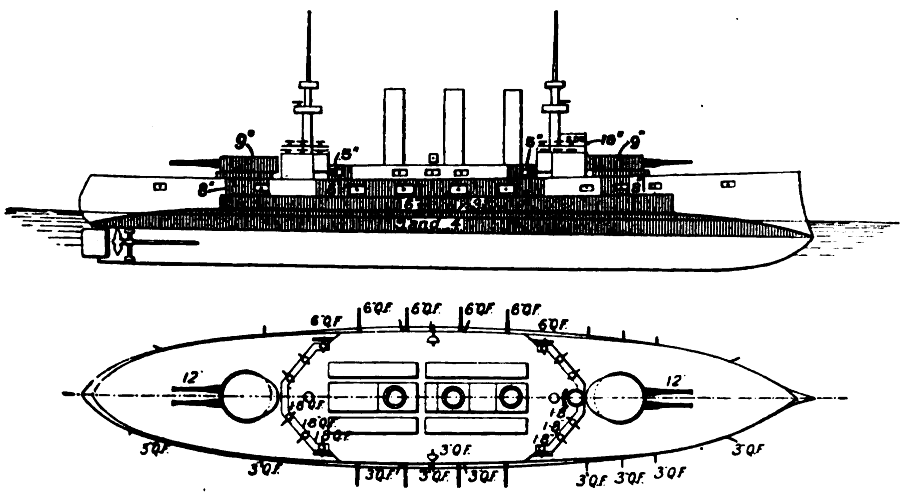


Note: In the "Pobieda" the Belt Extends the Full Length of the Ship.

Length, 401 ft. ; 12,674 tons ; Speed, 18 knots ; Completed, 1901 ; Armament, 4—10 in., 10—6 in., 20—12 pr., and small.

See page 237.

Hizen *late* **Retvizan.**



Length, 374 ft. ; 12,700 tons ; Speed, 18 knots ; Completed, 1902 ; Armament, 4—12 in., 12—6 in., 20—3 pr., 6 small.

See page 235.

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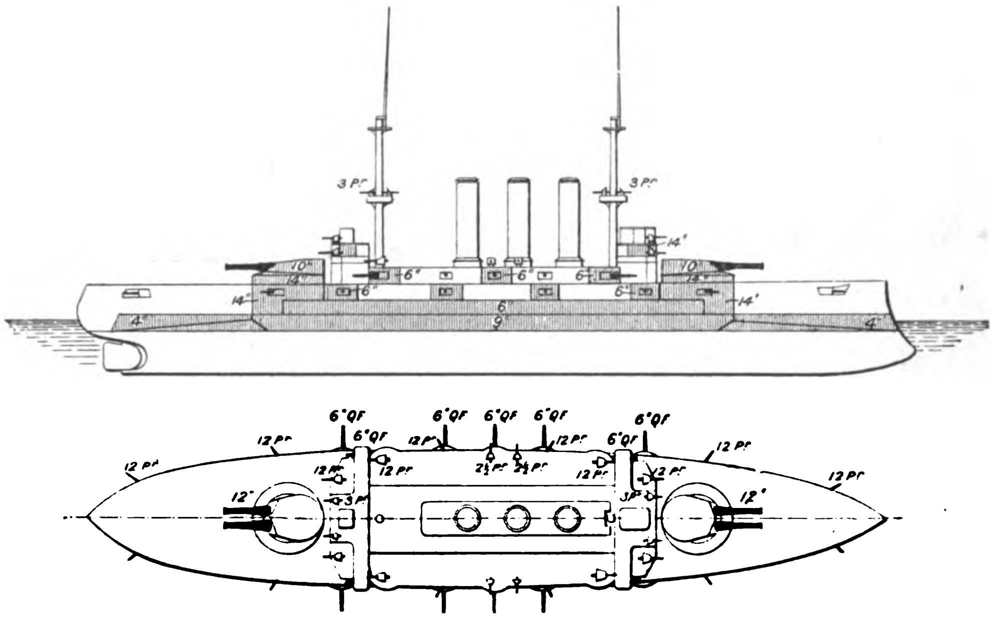
JAPAN.

BATTLESHIPS.

Asahi. **Shikishima.**

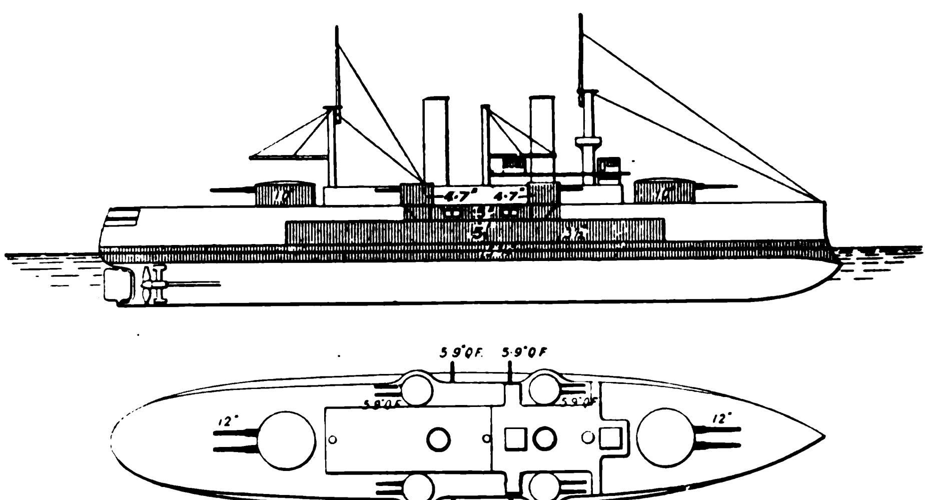


The "Asahi" have but two funnels.

Length, 400 ft.; 14,765 tons; Speed, 18—18·3 knots; Completed, 1899-1900; Armament, 4—12 in., 14—6 in., 20—12 pr., 12 small.

See page 235.

Tango *late* **Poltava.**



Length, 367 ft.; 10,960 tons; Speed, 16 knots; Completed, 1898; Armament, 4—12 in., 12—5·9 in., 14 small.

See page 237.

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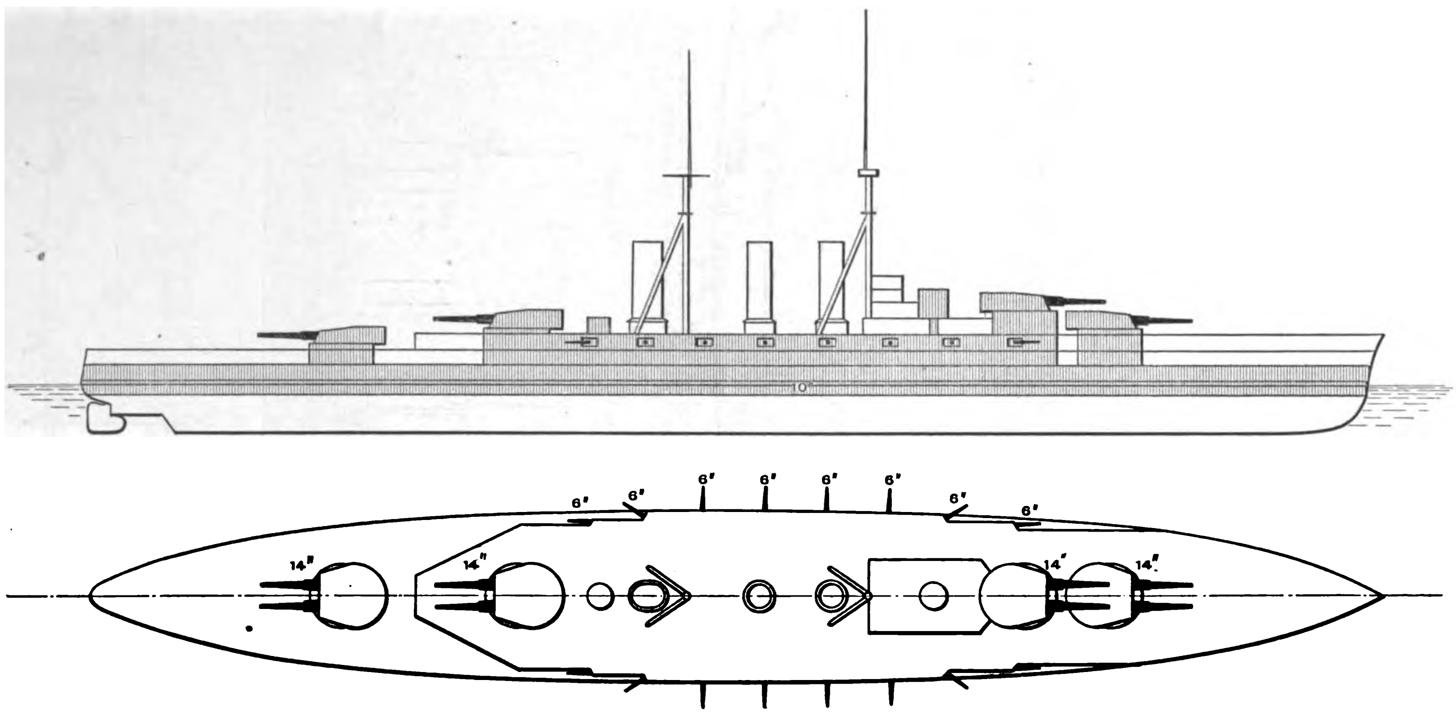
JAPAN.

BATTLE CRUISERS.

Kongo. Hiyei. Haruna. Kirishima.



Length, 704 ft.; 27,500 tons; Speed, 27 knots; Completed, 1913--Building; Armament, 8—14 in., 16—6 in., 18 small.

See page 236.

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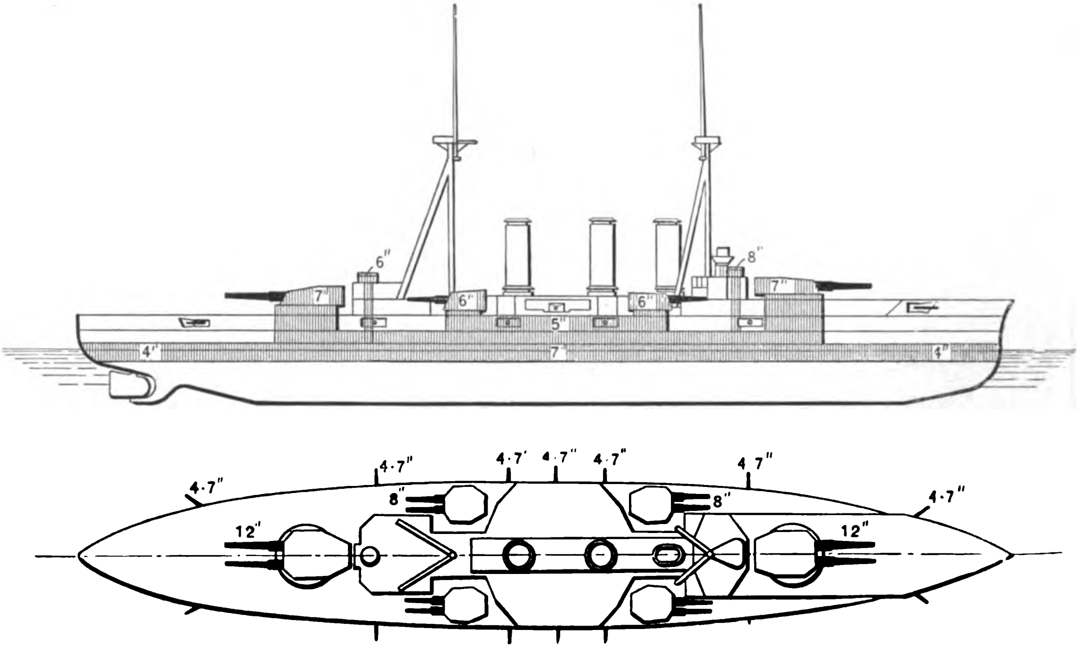
JAPAN.

ARMOURED CRUISERS.

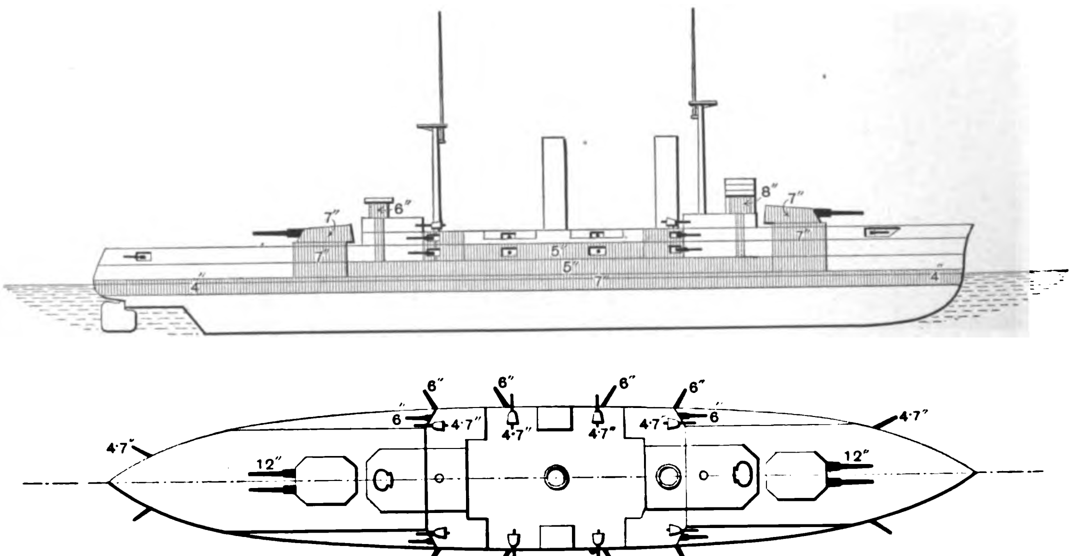
Ibuki. **Kurama.**



Length, 450 ft.; 14,620 tons; Speed, 22 knots; Completed, 1909—1911;
Armament, 4—12 in., 8—8 in., 14—4·7 in., 9 small.

See page 235.

Ikoma. **Tsukuba.**



Length, 440 ft.; 13,750 tons; Speed, 21 knots: Completed, 1907;
Armament, 4—12 in., 12—6 in., 12—4·7 in., 8 small.

See page 236.

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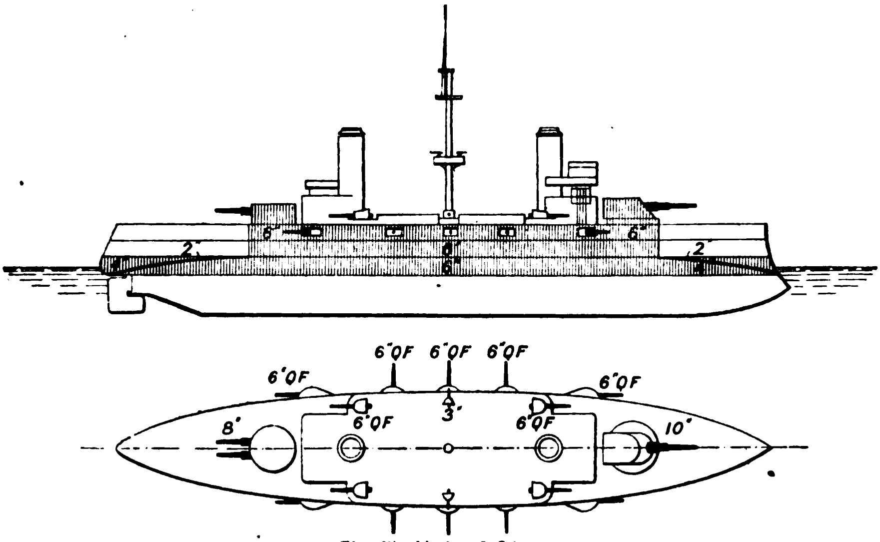
JAPAN.

ARMOURED CRUISERS.

Kasuga. **Nisshin.**

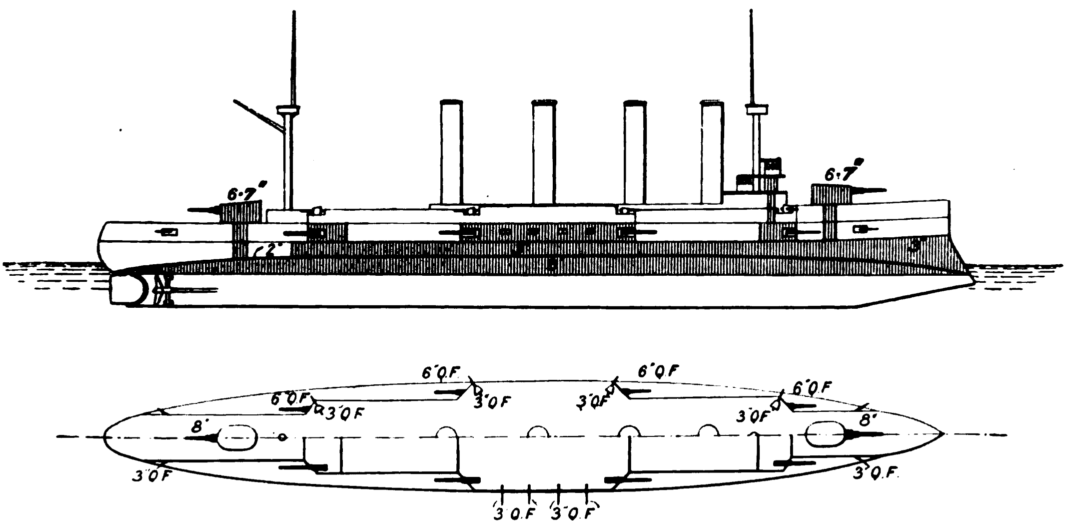


The Nisshin has 2-8 in. guns in fore barbette.

Length, 344 ft. ; 7630 tons ; Speed, 20 knots ; Completed, 1904 ; Armament, 1—10 in., 2—8 in., 14—6 in., 10—3 in., 8 small.

See page 236.

Aso *late* **Bayan.**



Length, 443 ft. ; 7726 tons ; Speed, 22 knots ; Completed, 1902 ; Armament, 2—8 in., 8—6 in., 22 small.

See page 235.

Plate 57.

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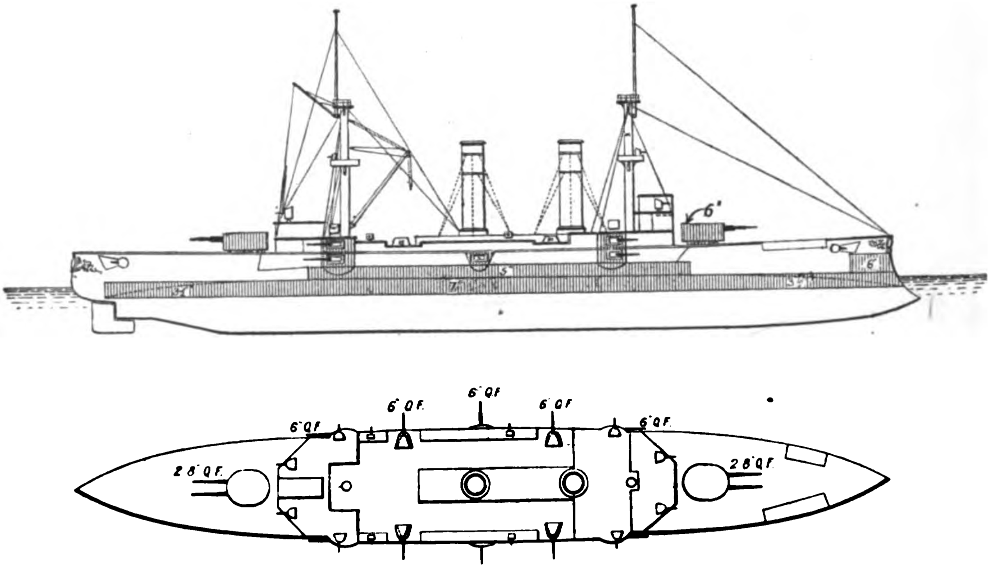
JAPAN.

ARMOURED CRUISERS.

Asama. **Tokiwa.**

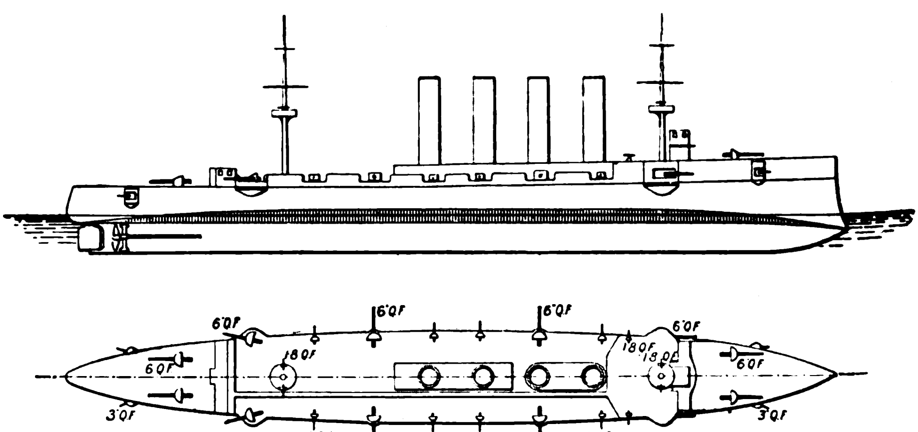


Length, 408 ft. ; 9850 tons ; Speed, 22·1—23 knots ; Completed, 1899 ; Armament, 4—8 in., 14—6 in., 12—12 pr., 8 small.

See page 235.

CRUISER.

Sōya *late* **Varyag.**



Length, 420 ft. ; 6500 tons ; Speed, 23 knots ; Completed, 1900 ; Armament, 12—6 in., 12—12 pr., 6 small.

See page 239.

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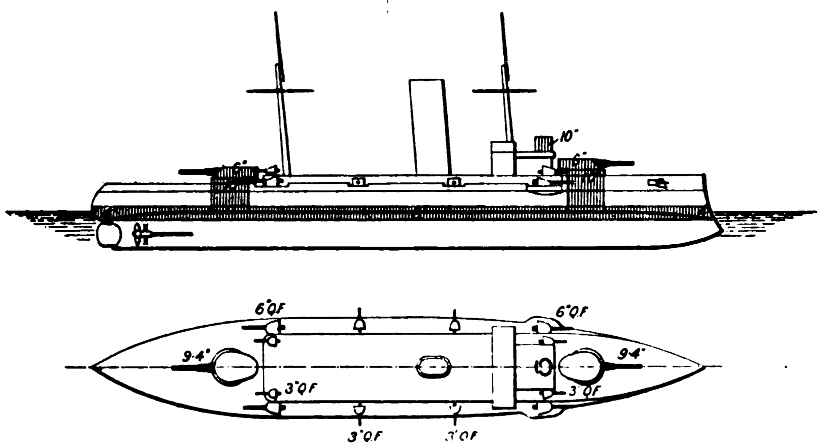
NETHERLANDS.

COAST DEFENCE SHIPS.

De Ruyter. Hertog Hendrik. Koningin Regentes. Marten Tromp.



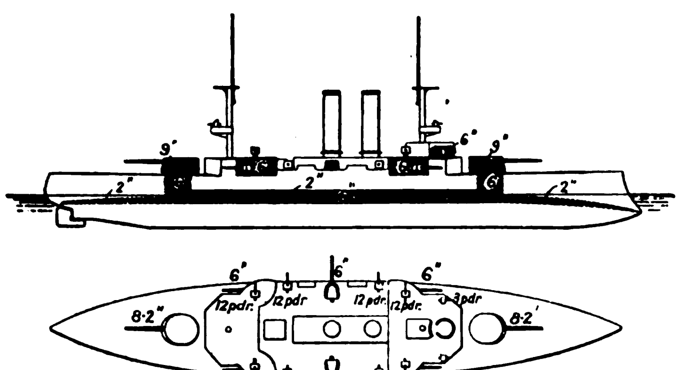
Length, 317 ft. ; 5014—5211 tons ; Speed, 16·5 knots ; Completed, 1902—1906 ; Armament, 2—9·4 in., 4—6 in., 10—3 in., 4 small.

See page 240.

NORWAY.

COAST DEFENCE SHIPS.

Norge. Eidsvold.



Length, 290 ft. ; 3847 tons ; Speed, 16·5 knots ; Completed, 1901 : Armament, 2—8·2 in., 6—6 in., 8—12 pr., 6 small.

See page 242.

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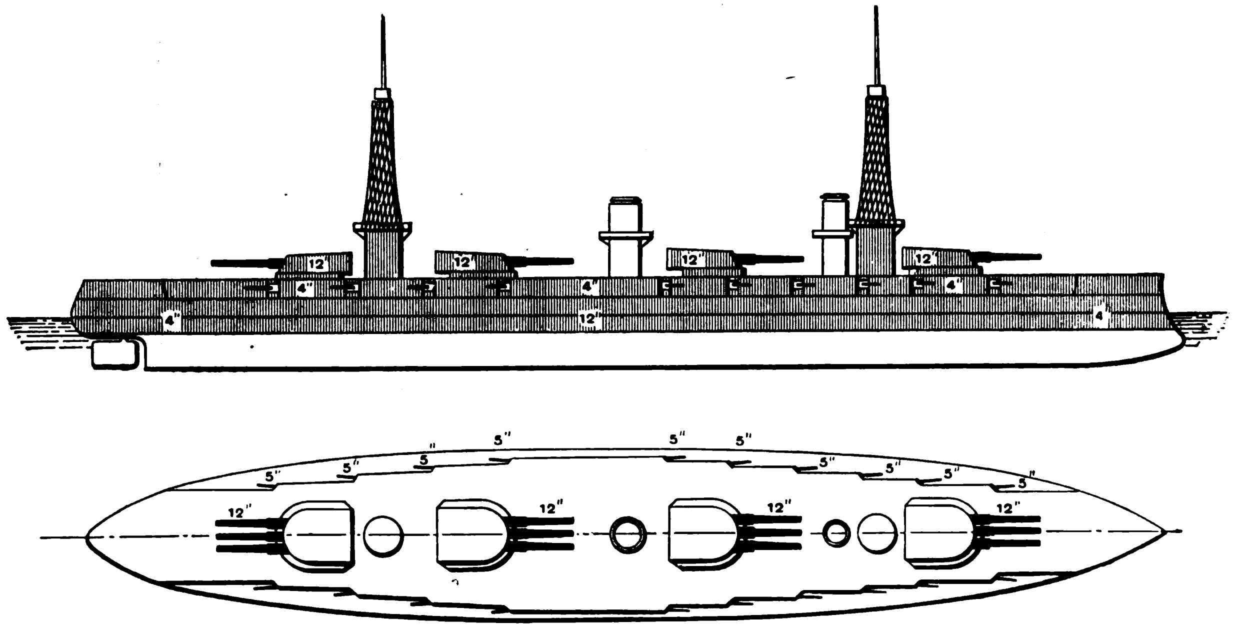
RUSSIA.

BATTLESHIPS.

Imperatritsa Maria. Imperator Alexander III. Imperatritsa Ekaterina I.



Length, 551 ft.; 22,500 tons; Speed, 21 knots; Building;
Armament, 12—12 in., 20—5 in.

See page 245.

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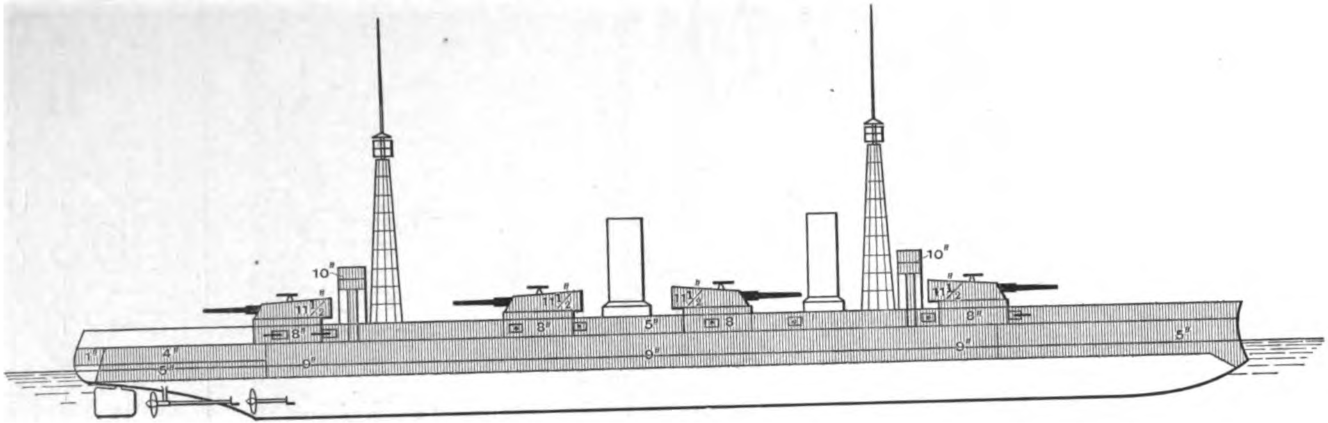
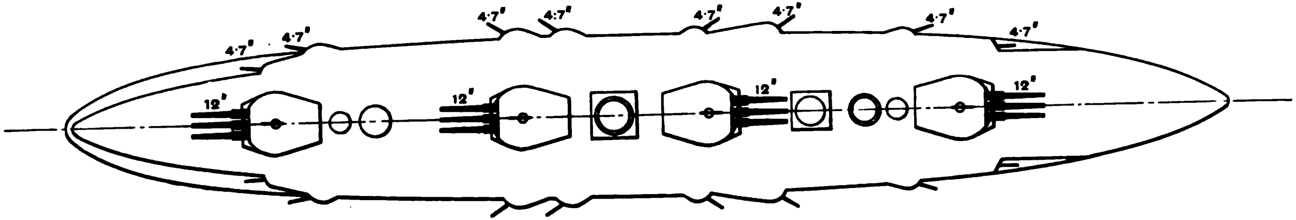
RUSSIA.

BATTLESHIPS.

Gangut. Petropavlovsk. Poltava. Sevastopol.





Length, 590 ft. ; 23,000 tons ; Speed, 23 knots ; Building ;
Armament, 12—12 in., 16—4·7 in., 4—3 pr., 8 small.

See page 244.

PLATE 61.

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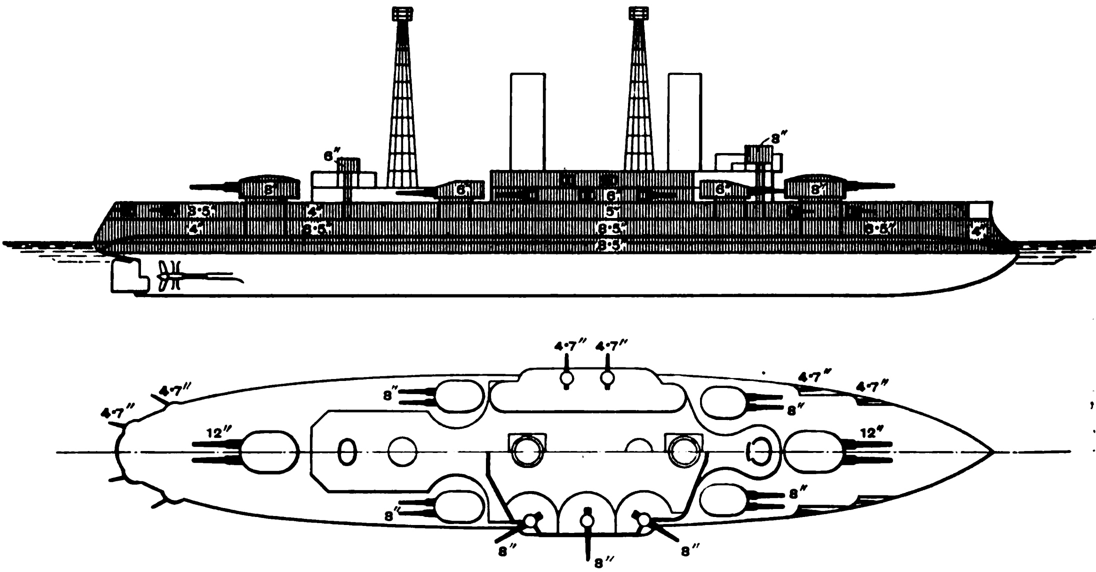
BATTLESHIPS.

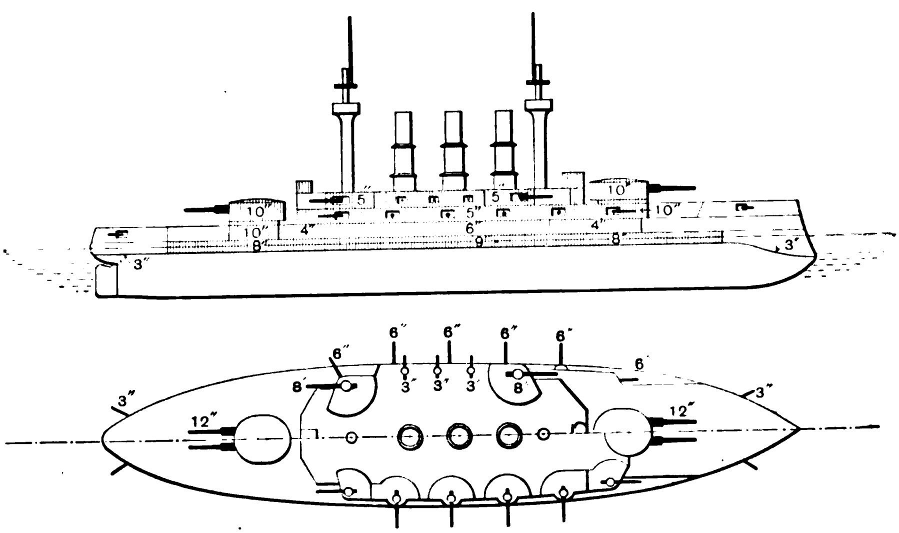
Andrei Pervozvannyi. **Imperator Pavel.**



Length, 430 ft.; 17,400 tons; Speed, 18 knots; Completed, 1910—1911; Armament, 4—12 in., 14—8 in., 12—4·7 in., 14 small.

See page 244.

Evstafi. **Ioann Zlatoust.**



Length, 372 ft.; 12,733 tons; Speed, 16 knots; Completed, 1910-11; Armament, 4—12 in., 4—8 in., 12—6 in., 14—3 in., 18 small.

See page 244.

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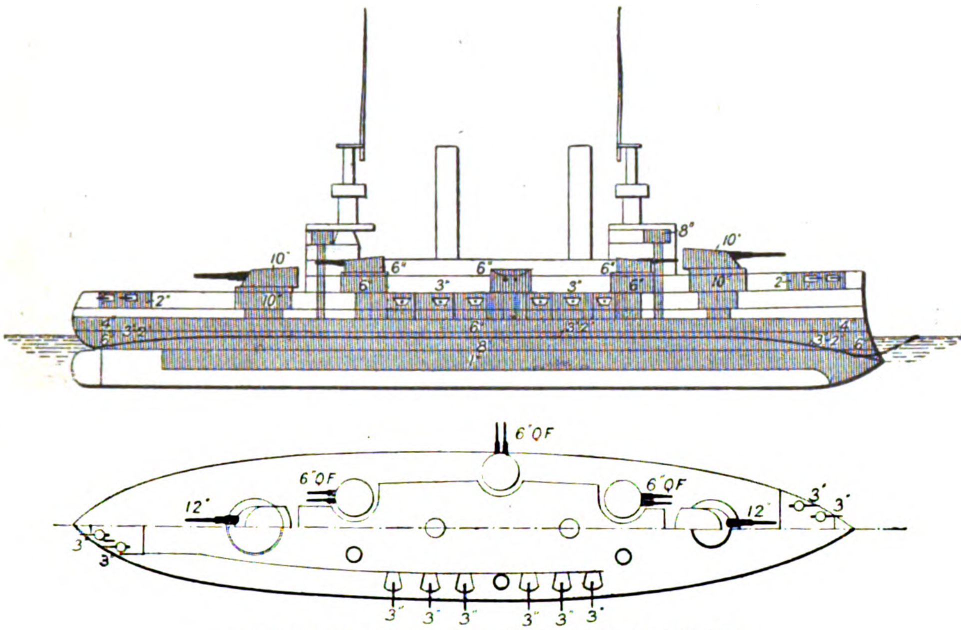
BATTLESHIPS.

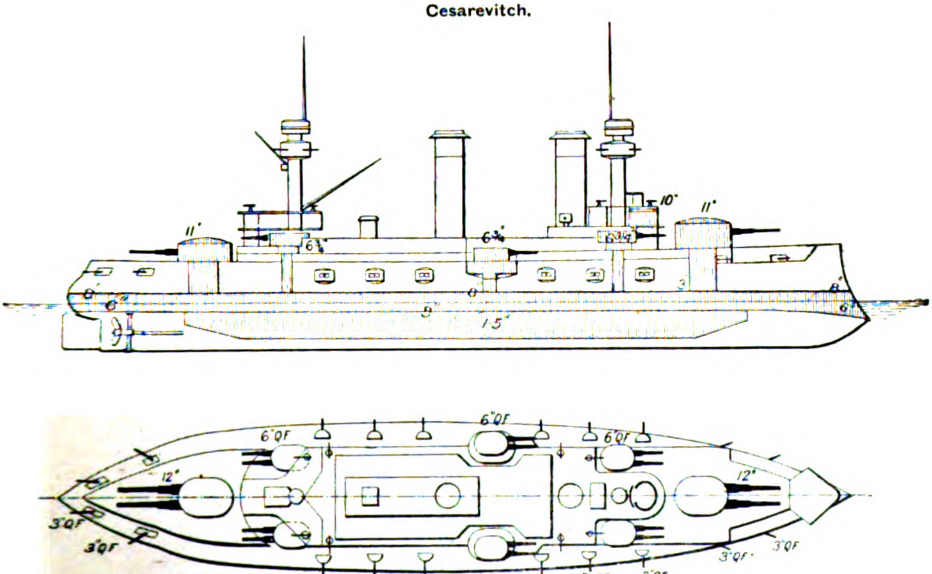
Slava.



Length, 367 ft. ; 13,516 tons ; Speed, 18 knots ; Completed, 1905 ;
Armament, 4—12 in., 12—6 in., 34—3 in., and small.

See page **245.**

Cesarevitch.



Length, 389 ft. ; 12,912 tons ; Speed, 19·6 knots ; Completed, 1903 ;
Armament, 4—12 in., 12—6 in., 20—3 in., 12 small.

See page 244.

PLATE 63.

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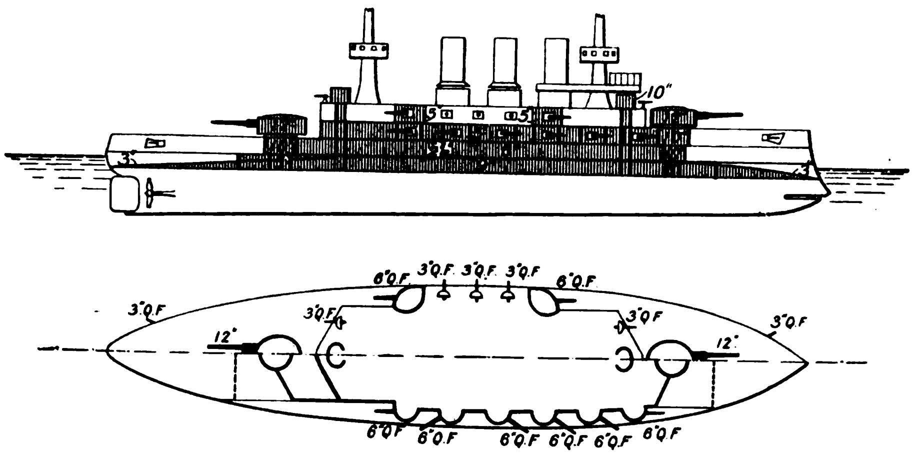
RUSSIA.

BATTLESHIPS.

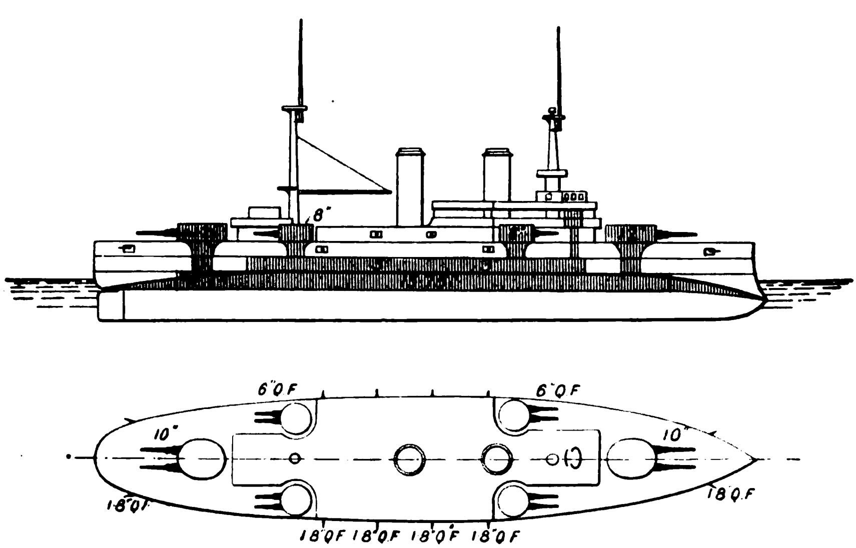
Panteleimon.



Length, 372 ft. ; 12,582 tons ; Speed, 17 knots ; Completed, 1902 ;
Armament, 4—12 in., 16—6 in., 14—3 in., 14 small.

See page 245.

Rostislav.



Length, 341 ft. ; 8880 tons ; Speed, 16 knots ; Completed, 1900 ;
Armament, 4—10 in., 8—6 in. ; 16 small.

See page 245.

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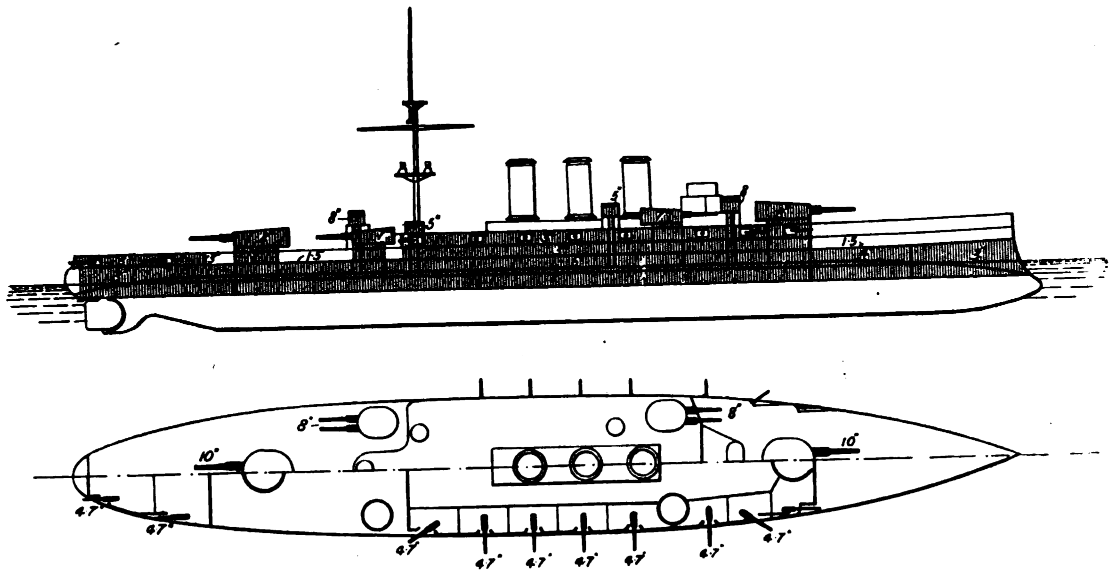
RUSSIA.

ARMOURED CRUISER.

Rurik.



Length, 490 ft.; 15,170 tons; Speed, 21 knots; Completed, 1907;
Armament, 4—10 in., 8—8 in., 20—4·7 in., 14 small.

See page 25.

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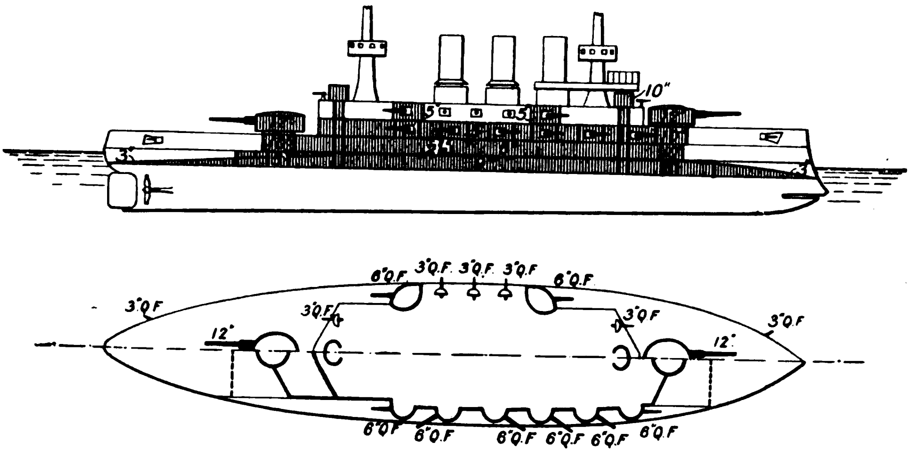
BATTLESHIPS.

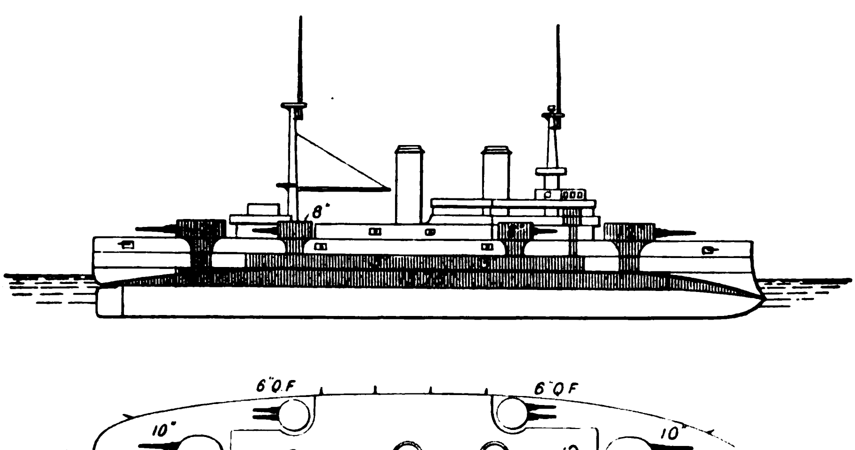
Panteleimon.



Length, 372 ft. ; 12,582 tons ; Speed, 17 knots ; Completed, 1902 ;
Armament, 4—12 in., 16—6 in., 14—3 in., 14 small.

See page 245.

Rostislav.



Length, 341 ft. ; 8880 tons ; Speed, 16 knots ; Completed, 1900 ;
Armament, 4—10 in., 8—6 in. ; 16 small.

See page 245.

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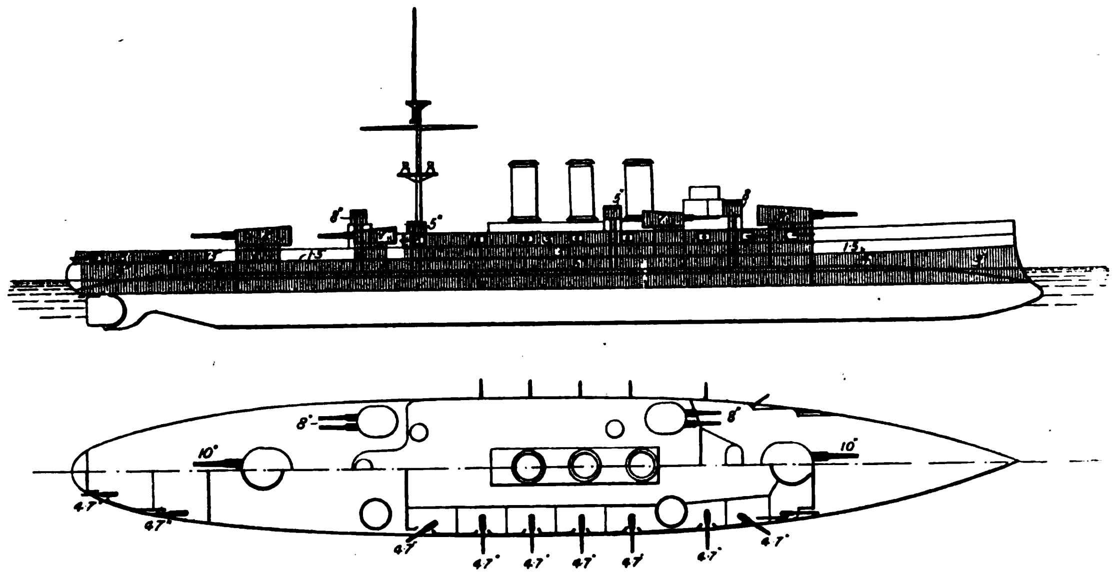
RUSSIA.

ARMOURED CRUISER.

Rurik.



Length, 490 ft. ; 15,170 tons ; Speed, 21 knots ; Completed, 1907 ;
Armament, 4—10 in., 8—8 in., 20—4·7 in., 14 small.

See page 25.

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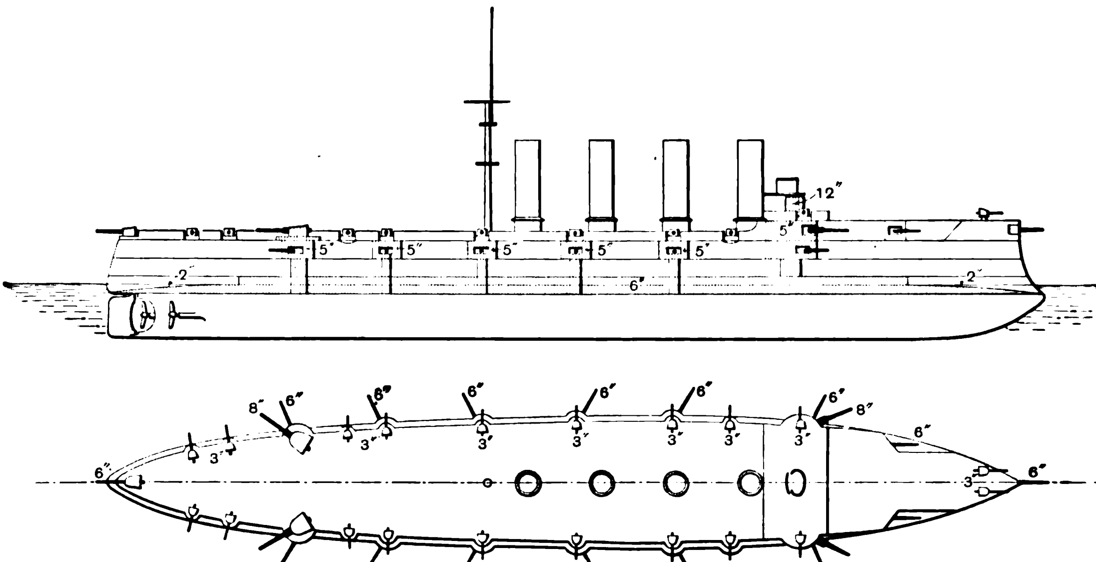
RUSSIA.

ARMOURED CRUISERS.

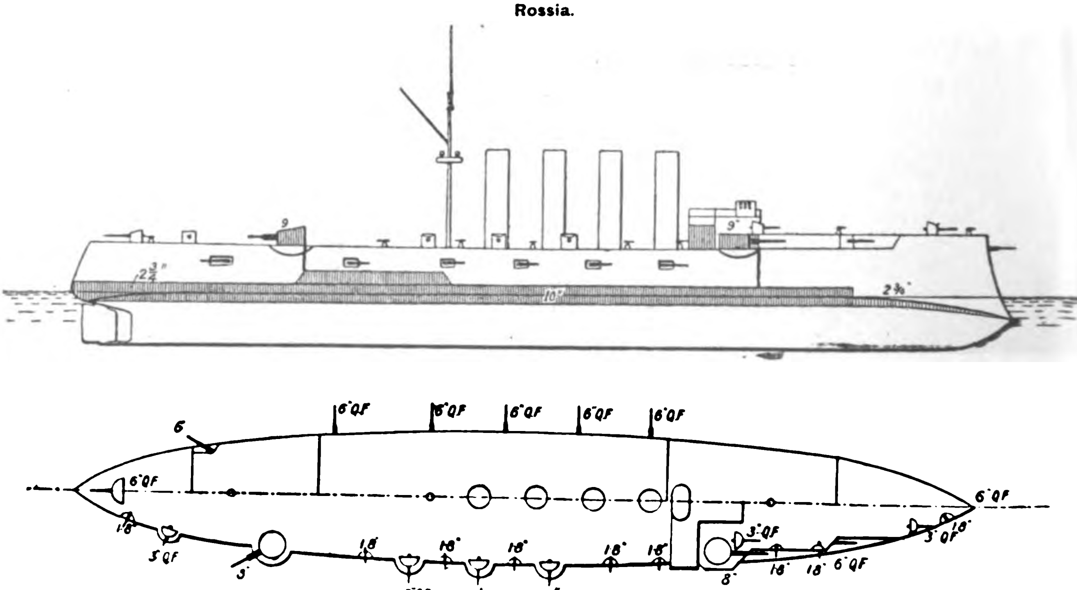
Gromoboi.



Length, 473 ft. ; 13,220 tons ; Speed, 20 knots ; Completed, 1900 ;
Armament, 4—8 in., 22—6 in., 20—3 in., 11 small.

See page 244.

Rossia.



Length, 480 ft. ; 12,195 tons ; Speed, 20 knots ; Completed, 1897 ;
Armament, 4—8 in., 22—6 in., 12—3 in., 20 small.

See page 245.

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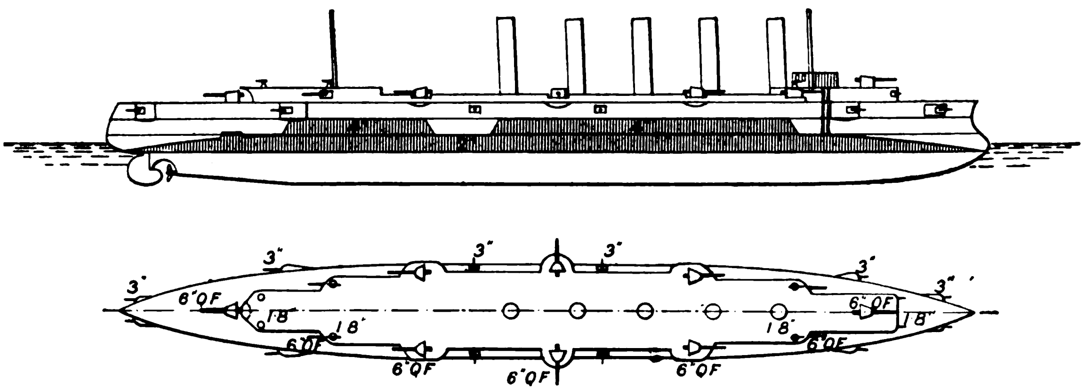
RUSSIA.

CRUISERS.

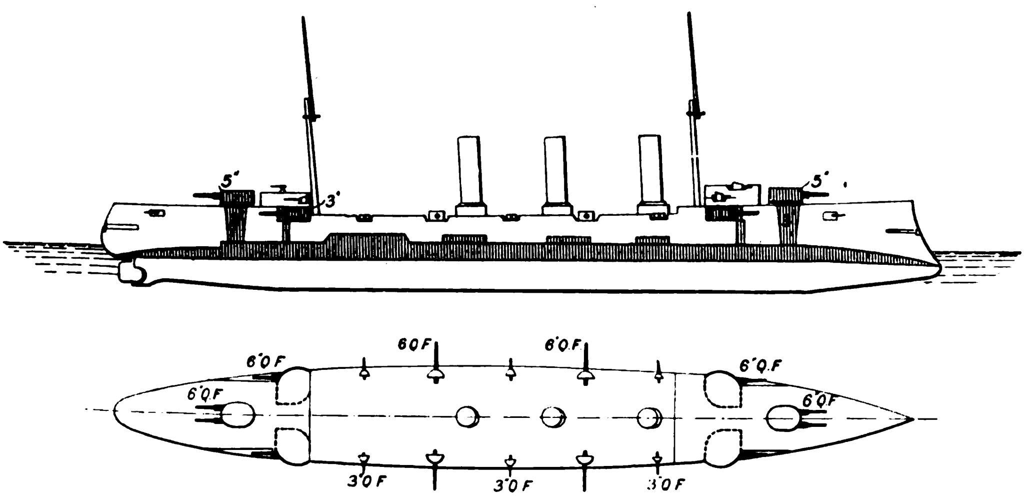
Askold.



Length, 426 ft. ; 5905 tons ; Speed, 23·8 knots ; Completed, 1901 ;
Armament, 12—6 in., 12—3 in., 14 small.

See page 246.

Bogatyr. Oleg.



Length, 417–440 ft. ; 6675 tons ; Speed, 23–24 knots ; Completed, 1902–1904 ;
Armament, 12—6 in., 12—3 in., 14 small.

See page 246.

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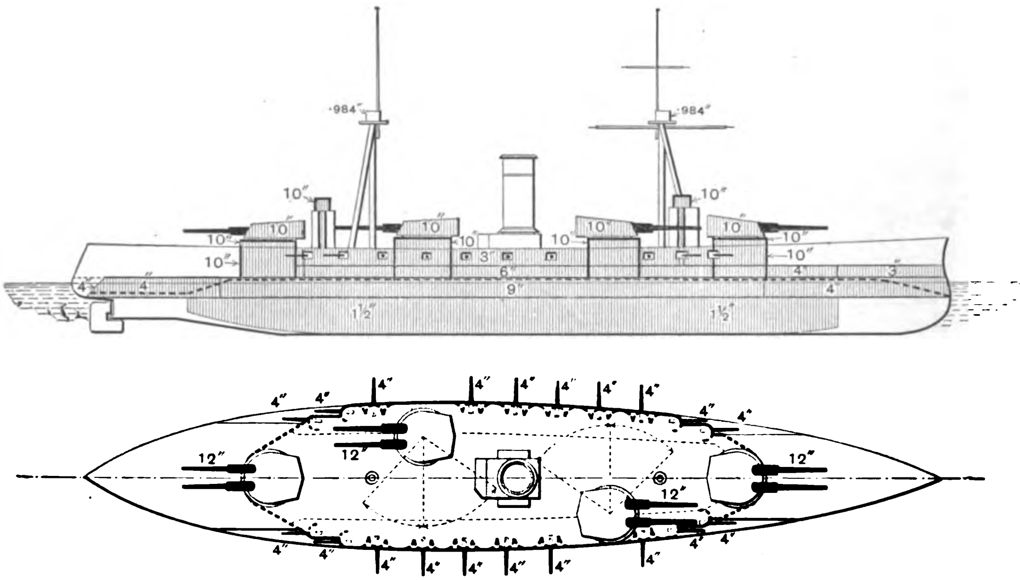
SPAIN.

BATTLESHIPS.

Alphonso XIII. España. Jaime I.

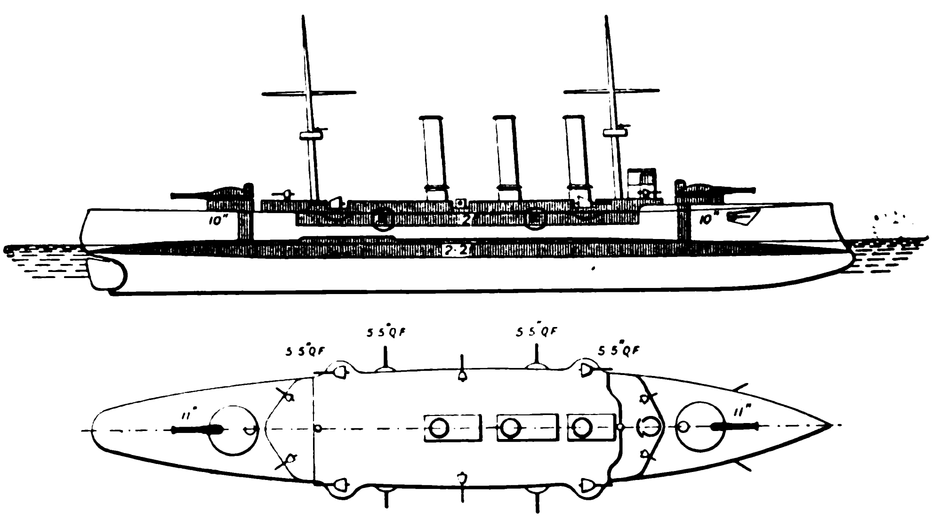


Length, 435 ft. ; 15,460 tons ; Speed, 19·5 knots ; Building ; España completed 1913 ; Armament, 8—12 in., 20—4 in., 6 small.

See page 248.

ARMOURED CRUISER.

·Emperador Carlos V.



Length, 380 ft. ; 9089 tons ; Speed, 20 knots ; Completed, 1898 ; Armament, 2—11 in., 8—5·5 in., 4—3·9 in., 12 small.

See page 248.

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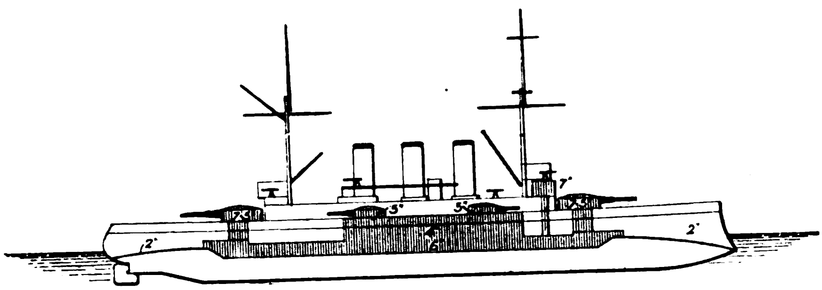
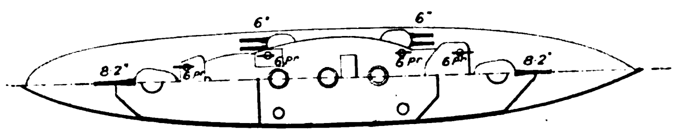
SWEDEN.

BATTLESHIP.

Oscar II.



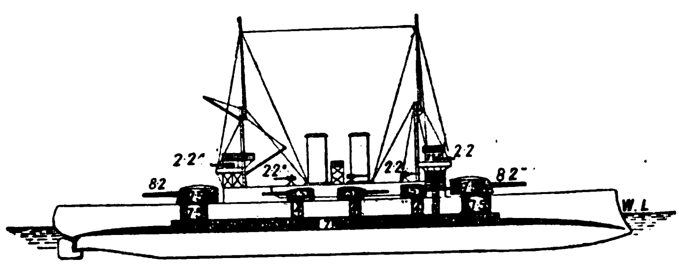


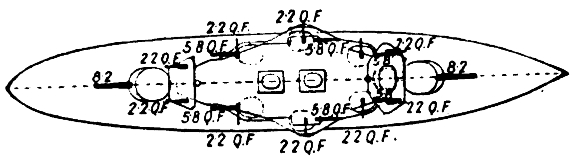
Length, 314 ft. ; 4203 tons ; Speed, 18 knots ; Completed, 1907 ;
Armament, 2—8·2 in., 8—6 in., 14 small.

See page 250.

COAST DEFENCE SHIPS.

Aeran. **Manligheten.** **Tapperheten.** **Wasa.**





Length, 287 ft. ; 3612 tons ; Speed, 16·5–17·2 knots ; Completed, 1902–1906 ;
Armament, 2—8·2 in., 6—5·8 in., 14 small.

See page 250.

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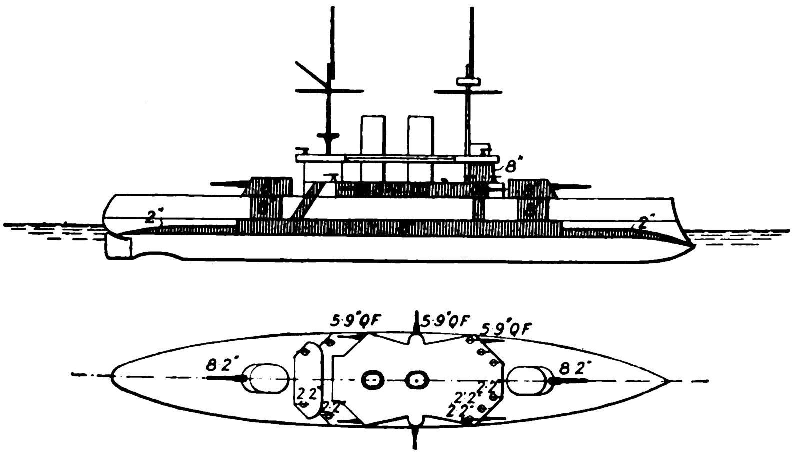
SWEDEN.

COAST DEFENCE SHIP.

Dristigheten.

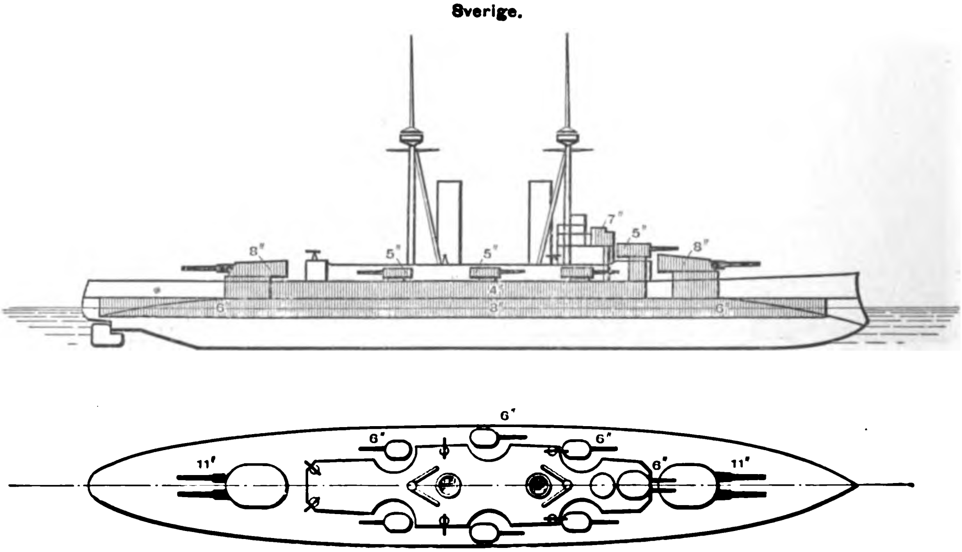


Length, 285 ft. ; 3445 tons ; Speed, 16·5 knots ; Completed, 1901 ;
Armament, 2—8·2 in., 6—5·9 in., 12 small.

See page 250.

ARMOURED CRUISER.

Sverige.



Length, 390 ft. ; 7,100 tons ; Speed, 22 knots ; Building ;
Armament, 4·11 in. ; 8—6 in. ; 6—12 pr.

See page 250.

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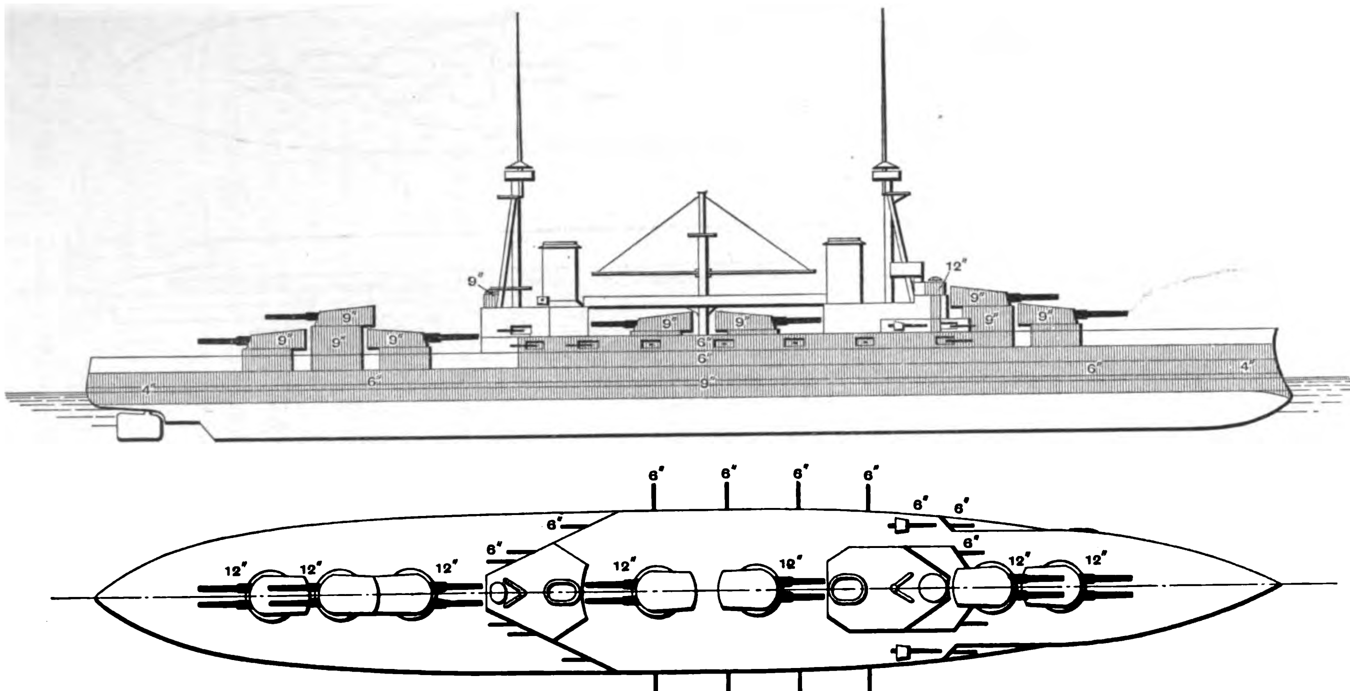
TURKEY.

BATTLESHIP.

Birindji Osman (*Ex* Rio de Janeiro).



Length, 637 ft. ; 27,500 tons ; Speed, 22 knots ;
Armament, 14—12 in. ; 20—6 in. 10—12 pr.

See page 252.

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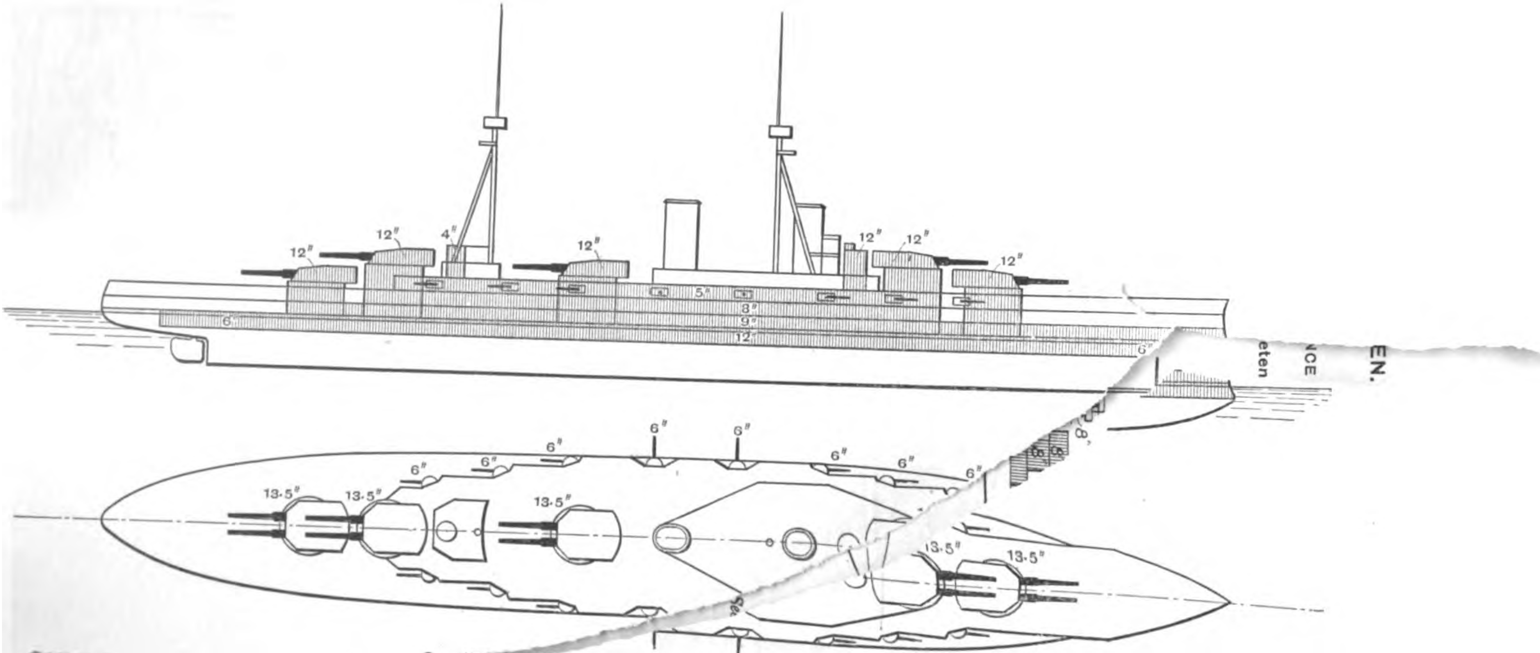
TURKEY.

BATTLESHIP.

Reshadieh.



Length, 525 ft. ; 23,000 tons ; Speed, 21 knots ; Building ;
Armament, 10—13·5 in., 16—6 in.

See page 252.

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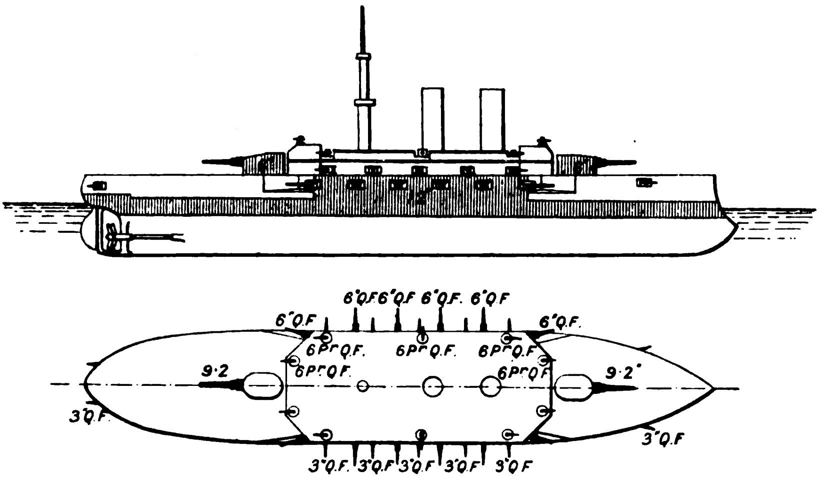
TURKEY.

BATTLESHIP.

Messoudieh.

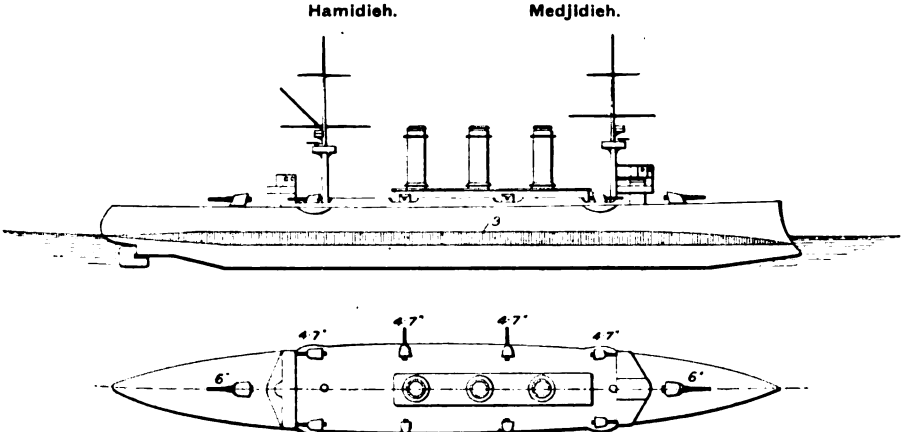


Length, 331 ft.; 9120 tons; Speed, 17·5 knots; Completed, 1901;
Armament, 2—9·2 in., 12—6 in., 14—3 in., 14 small.

See page 252.

CRUISERS.

Hamidieh. **Medjidieh.**



Length, 331—340 ft.; 3432—3800 tons; Speed, 22·2 knots; Completed, 1904;
Armament, 2—6 in., 8—4·7 in., 12 small.

See page 253.

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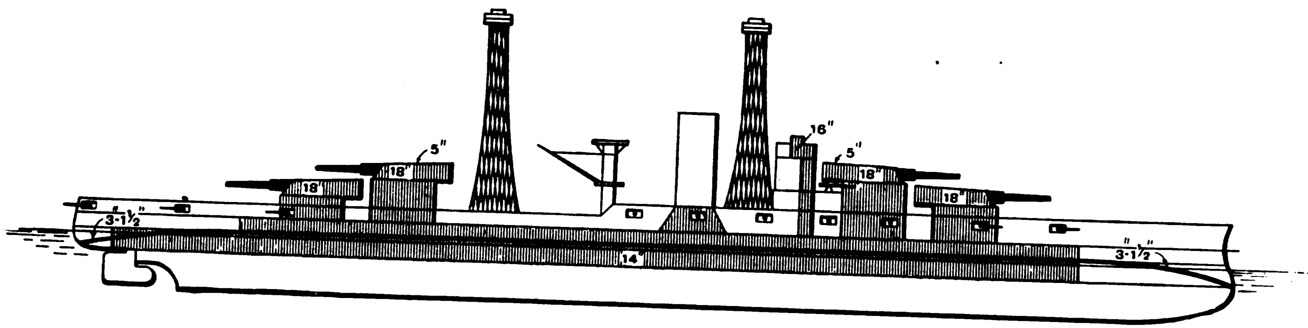
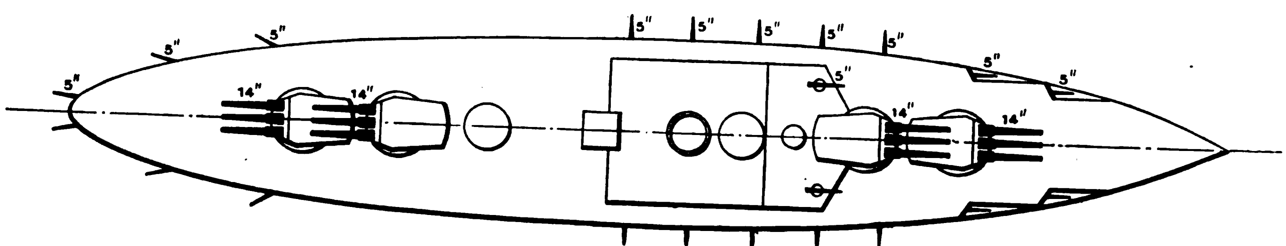
UNITED STATES.

BATTLESHIPS.

Pennsylvania. No. 39.





Length, 600 ft.; 31,400 tons; Speed, 21 knots; Building; Armament, 12—14 in., 22—5 in., 10 small.

See page 256.

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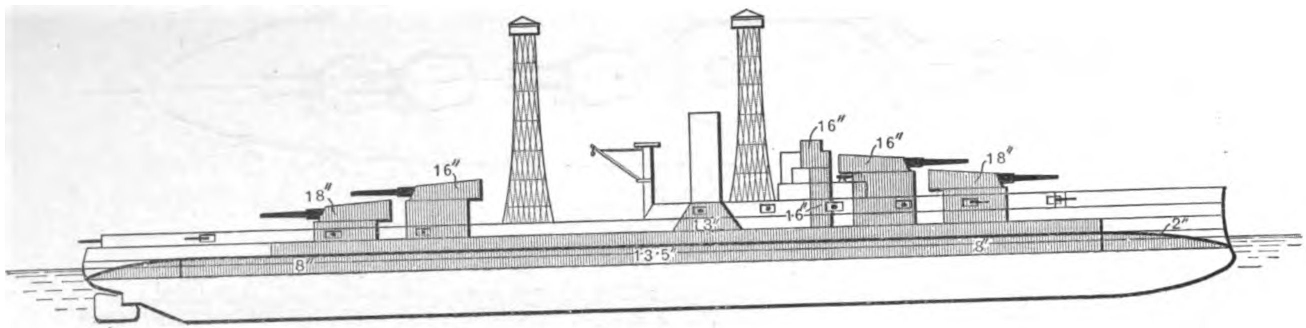
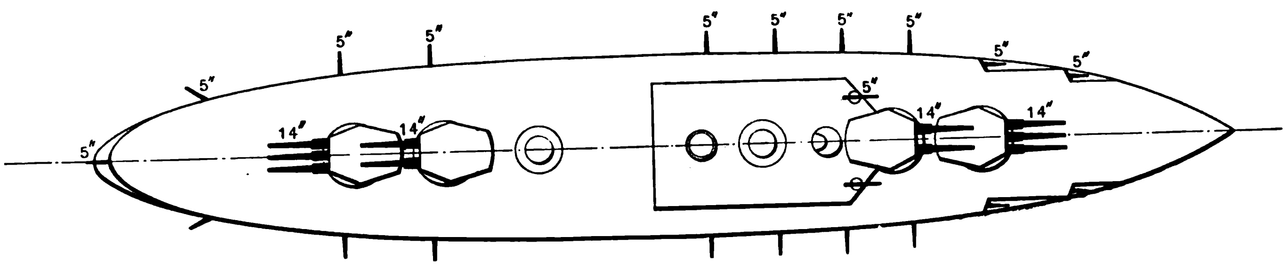
UNITED STATES.

BATTLESHIPS.

Nevada. **Oklahoma.**





Length, 575 ft.; 27,500 tons; Speed, 20·5 knots; Building;
Armament. 10—14 in.; 21—5 in.; 10 smaller.

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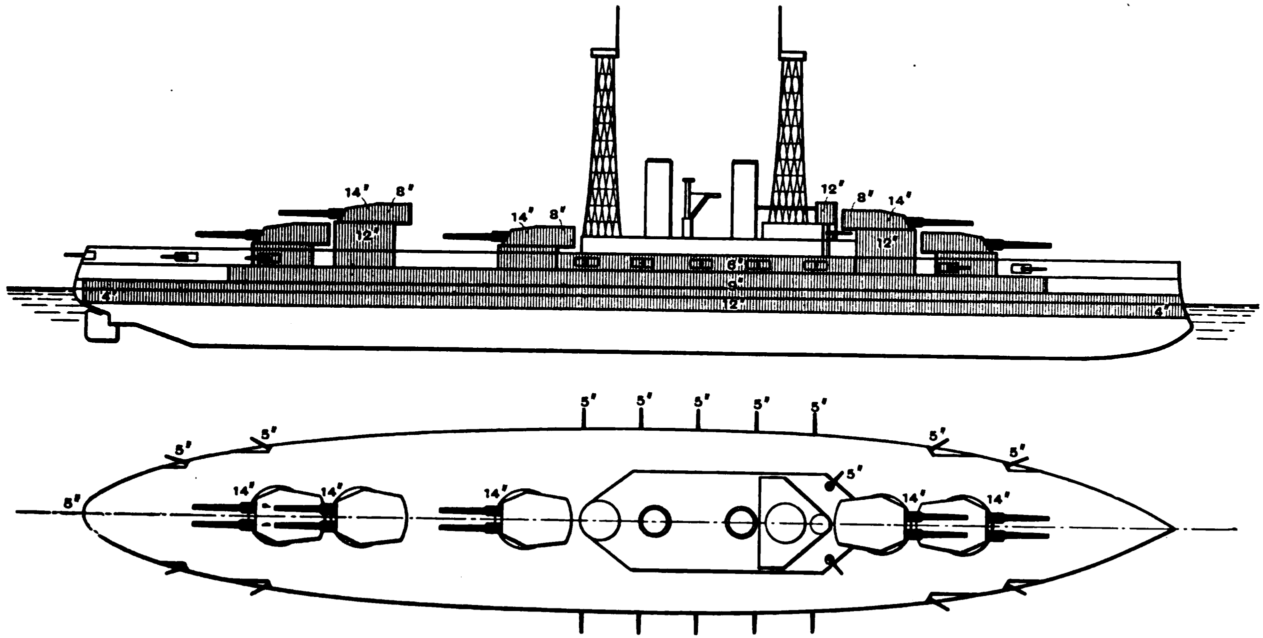
UNITED STATES.

BATTLESHIPS.

New York. Texas.



Length, 573 ft. ; 27,000 tons ; Speed, 21 knots ; 1914—Building ;
Armament, 10—14 in., 21—5 in. ; 10 small.

See page 255.

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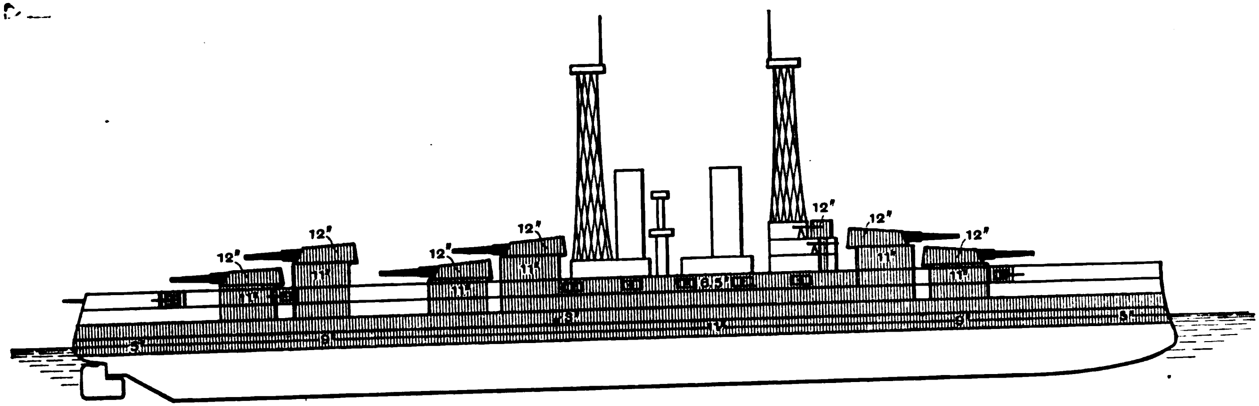
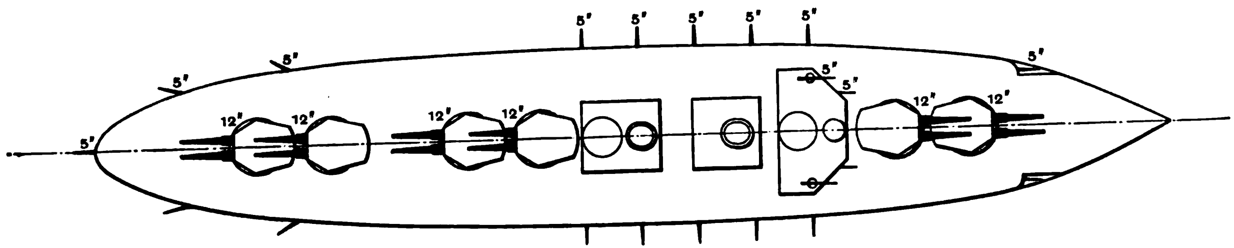
UNITED STATES.

BATTLESHIPS.

Arkansas. **Wyoming.**





Length, 554 ft.; 26,000 tons; Speed, 21 knots; Completed, 1912;
Armament, 12—12 in., 21—5 in., 4—3 pr.; 4 small.

See page 254.

PLATE 77.

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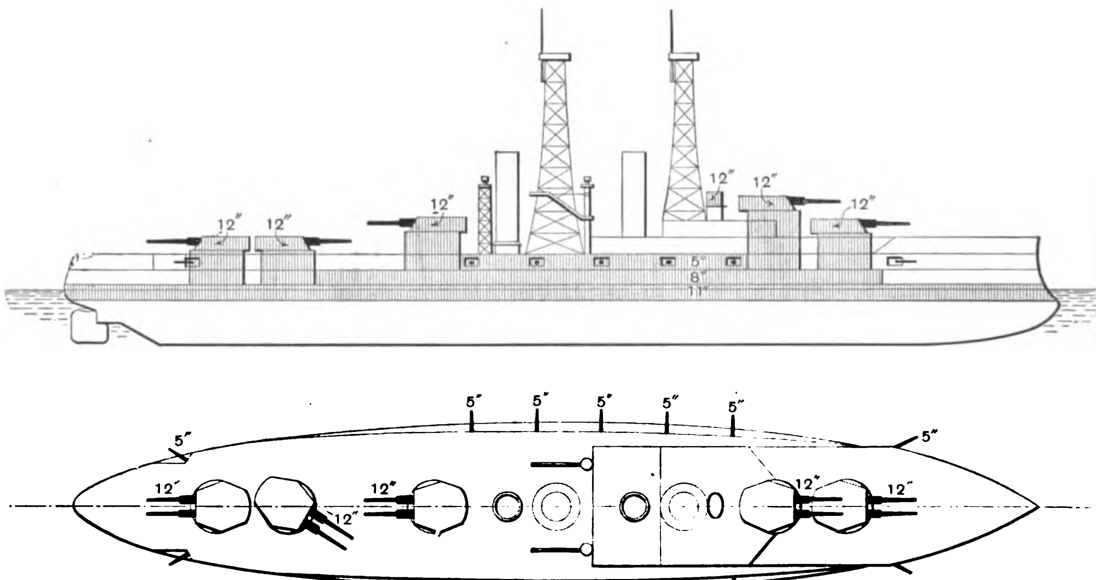
BATTLESHIPS.

Delaware. North Dakota. Florida. Utah.

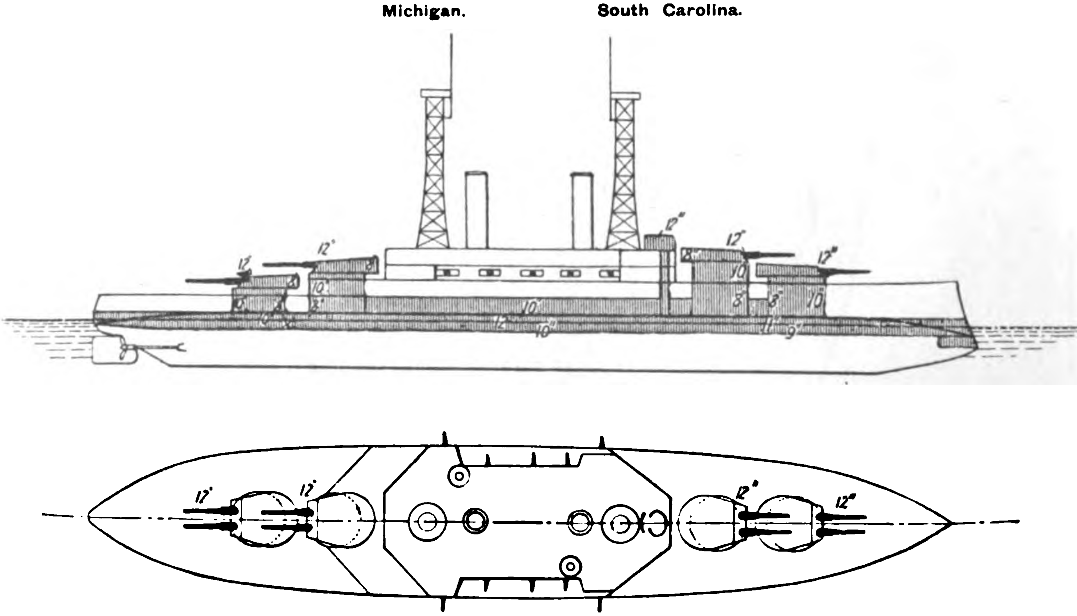


Delaware } Length, 510 ft. ; 20,000 tons ; Speed, 21·5 knots ; Completed, 1910 ;
North Dakota } Armament, 10—12 in., 14—5 in., 16 small.

Florida } Length, 510 ft. ; 21,825 tons ; Speed, 21-21·6 knots ; Completed, 1911 ;
Utah } Armament, 10—12 in., 16—5 in., 10 small.

See page 254.

Michigan. South Carolina.



Length, 450 ft. ; 16,000 tons ; Speed, 18·8 knots ; Completed, 1909 ;
Armament, 8—12 in., 22—3 in., 14 small.

See page 255.

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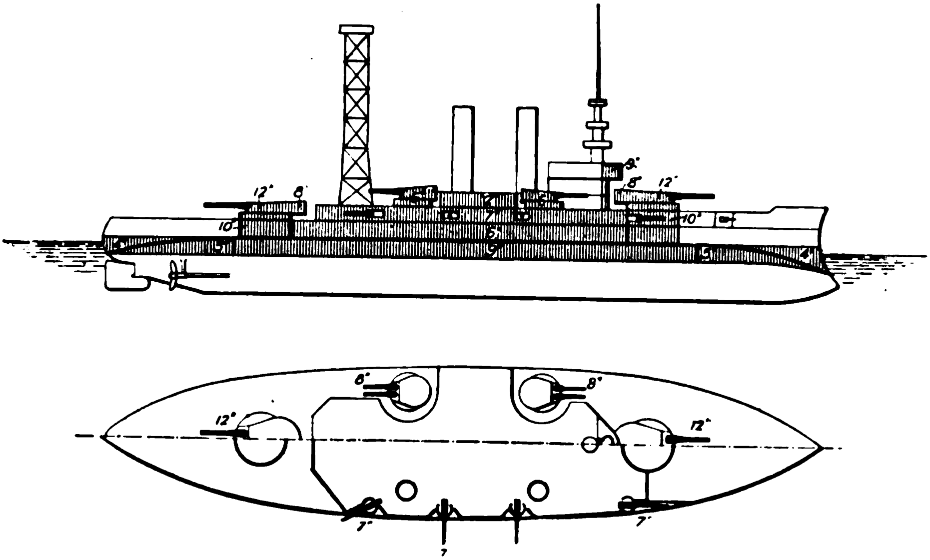
UNITED STATES.

BATTLESHIPS.

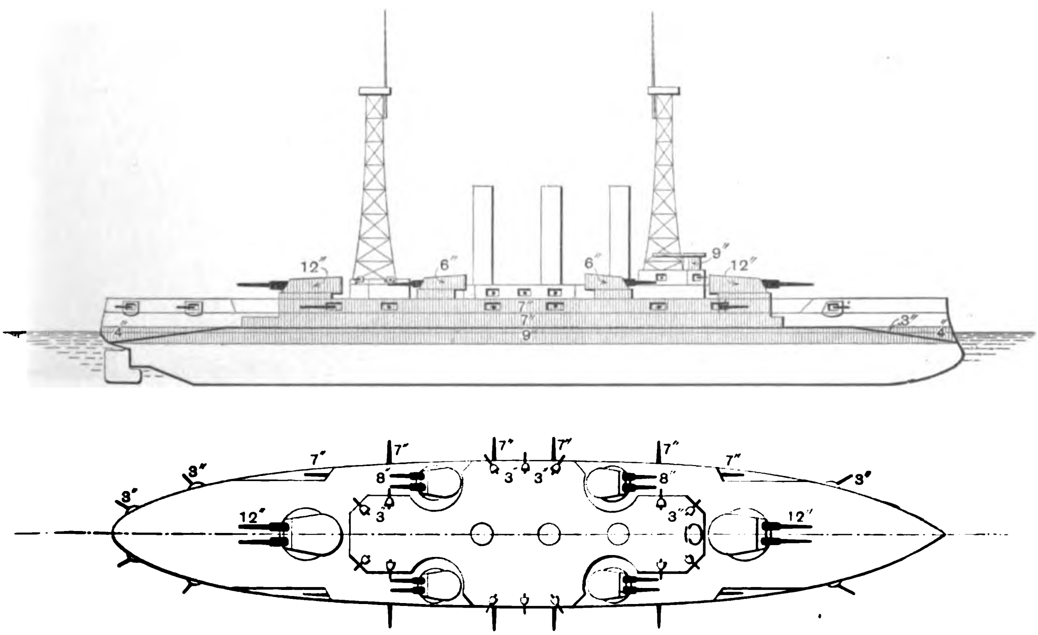
Idaho. **Mississippi.**



Length, 375 ft. ; 13,000 tons ; Speed, 17 knots ; Completed, 1908 ;
Armament, 4—12 in., 8—8 in., 8—7 in., 12—3 in., 20 small.

See page 254.

Connecticut. **Kansas.** **Louisiana.** **Minnesota.** **New Hampshire.** **Vermont.**



Length, 450 ft. ; 16,000 tons ; Speed, 18·1—18·8 knots ; Completed, 1906–1908 ;
Armament, 4—12 in., 8—8 in., 12—7 in., 20—3 in., 30 small.

Connecticut and Louisiana have 11 in. belt instead of 9 in., and have only 2—3-in. guns at the stern. New Hampshire has two military masts in place of the towers. Minnesota has one mast and one tower.

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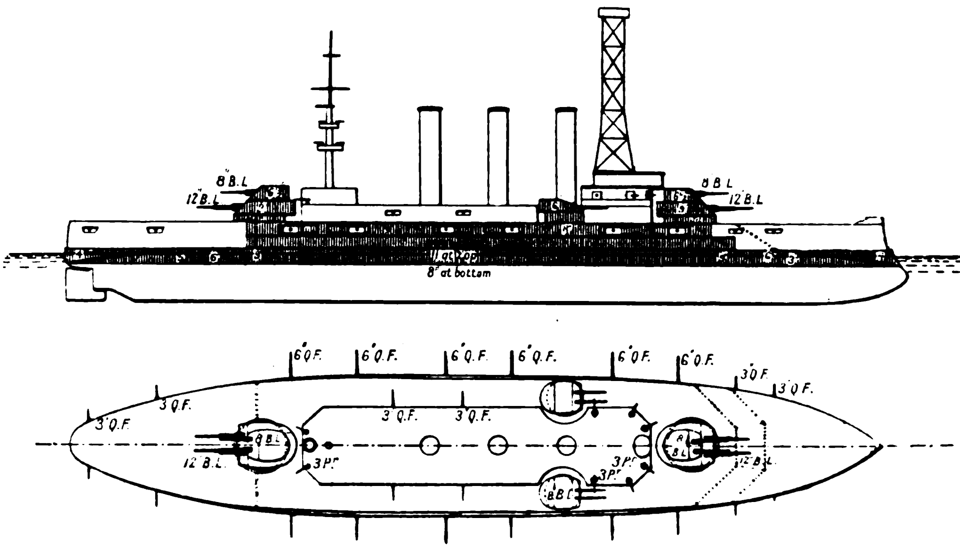
UNITED STATES.

BATTLESHIPS.

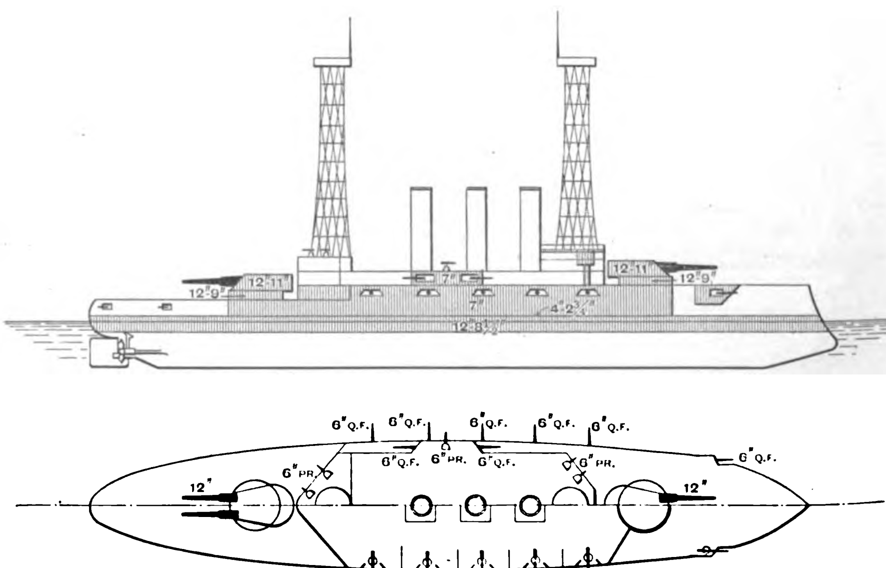
Georgia. **Nebraska.** **New Jersey.** **Rhode Island.** **Virginia.**



Length, 435 ft. ; 14,948 tons ; Speed, 19—19·4 knots ; Completed, 1906-1907 ; Armament, 4—12 in., 8—8 in., 12—6 in., 12—3 in., 30 small.

See page 254.

Maine. **Missouri.** **Ohio.**



Length, 388 ft. ; 12,500 tons ; Speed, 17·8—18·1 knots ; Completed, 1902-1904 ; Armament, 4—12 in., 16—6 in. 6—3 in., 18 small.

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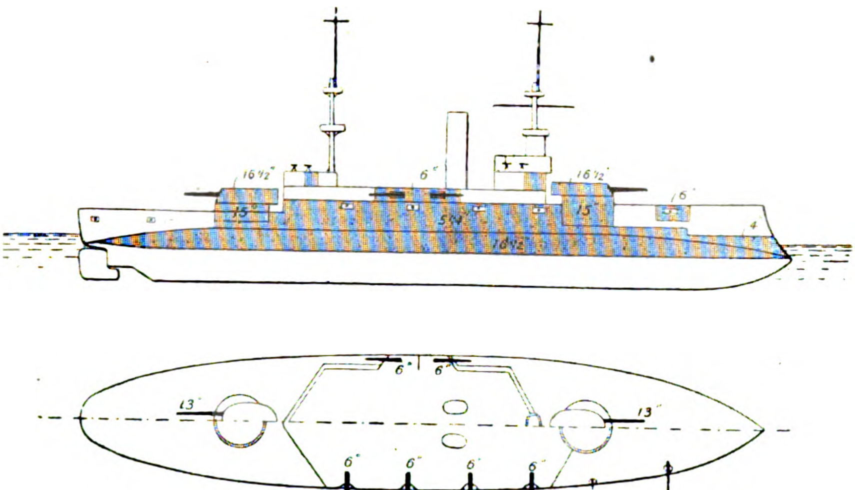
UNITED STATES.

BATTLESHIPS.

Alabama. **Illinois.** **Wisconsin.**

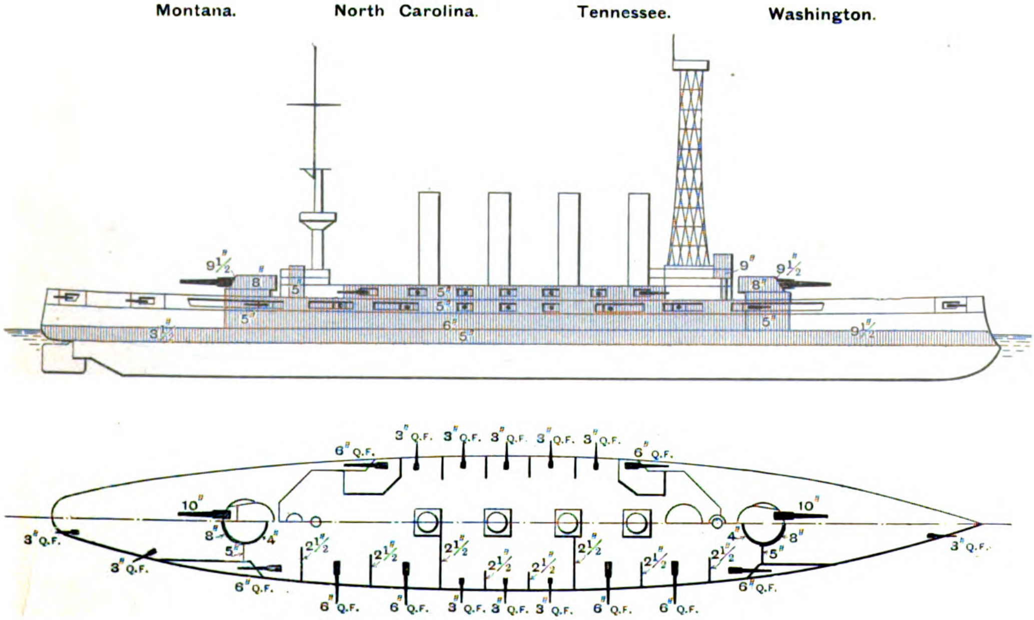


Length, 368 ft.; 11,565—11,653 tons; Speed, 17—17·45 knots; Completed, 1900–1901; Armament, 4—13 in., 14—6 in., 24 small.

See page 254

ARMOURED CRUISERS.

Montana. **North Carolina.** **Tennessee.** **Washington.**



Length, 502 ft.; 14,500 tons; Speed, 22—22·5 knots; Completed, 1906–1908; Armament, 4—10 in., 16—6 in., 22—3 in., 22 small.

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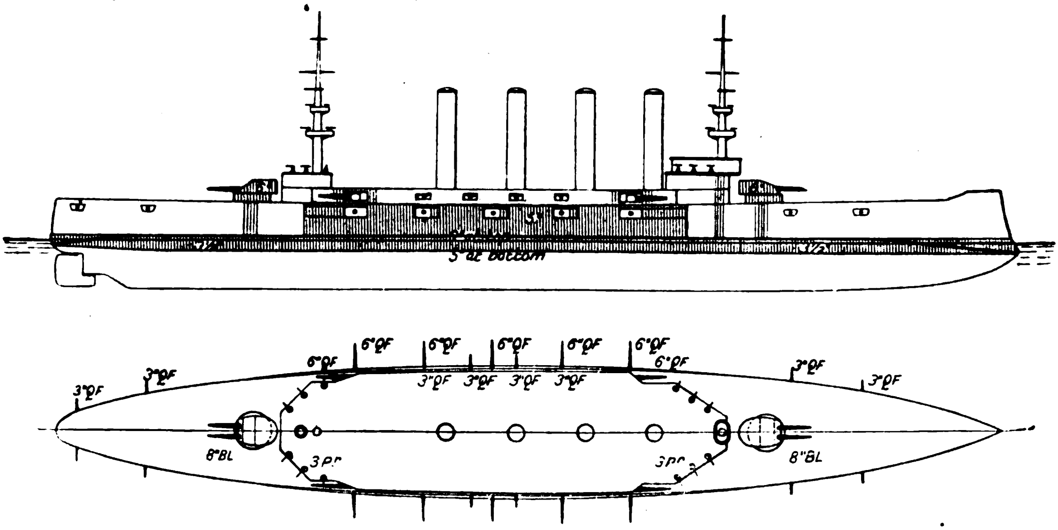
ARMOURED CRUISERS.

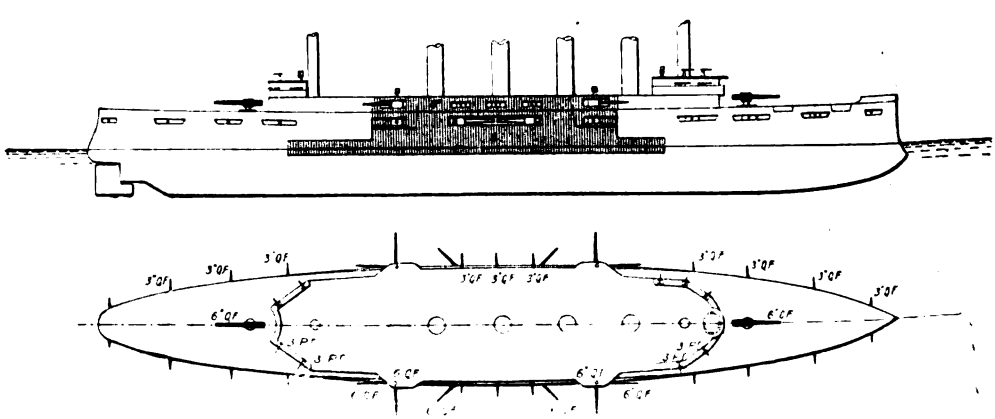
California. Colorado. Maryland. Pittsburg. South Dakota. West Virginia.



Length, 502 ft. ; 13,680 tons ; Speed, 22—22·4 knots ; Completed, 1905–1907
Armament, 4—8 in., 14—6 in., 18—3 in., 30 small.

See page 254.

Charleston. Milwaukee. St. Louis.



Length, 424 ft. ; 9700 tons ; Speed, 22 knots ; Completed, 1906 ;
Armament, 14—6 in., 18—3 in., 36 small.

See page 254.

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PART III.

ARMOUR AND ORDNANCE.

ORDNANCE TABLES.

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PART III.

ARMOUR AND ORDNANCE.

STUDENTS of the art of attack and defence by sea must have noticed that the past year has been one of unusual and significant activity and change, both at home and abroad. There has been manifest a widespread inclination for experiment and essay with new means and new methods—a desire for something different, if not always for something better, than that which is old and well-tried. Partly, this movement may be accounted for by the continued achievement and advance which has been made with the seaplane and the submarine. The feats performed both by the air-craft and by the under-water vessels during the past year have plainly demonstrated that they may have a very real and increasing value for war purposes. It would not be surprising, therefore, if these new munitions of war should have a distinct influence on warship design. In some quarters, at least, it is now felt that the new weapons, together with the increased range and efficiency of the torpedo, constitute an insistent menace, in the near future, to the supremacy of the gun and its carrier—the battleship. General advance.

It has, indeed, been said that the struggle for supremacy between the torpedo and the gun, considered relatively as elements of offence and defence, now equals, if it does not transcend, in importance, that between the gun and the armour, which for so many years provided the most perplexing problem for the solution of naval artillerists and architects. It is now well-nigh admitted by all authorities that even the best and thickest armour afloat does not, at decisive ranges, and measured by peace tests, provide absolute immunity against the gun attack. Even at the distances made necessary by the development of the torpedo, it is likely that the larger calibre guns are sufficiently powerful to put their projectiles through any of the armoured positions of all battleships now afloat. Possibly Mr. Churchill had this in mind when he compared an action between battleships to a couple of eggshells striking each other with hammers. That all nations continue to increase the area of the ship which is armoured,

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and the thickness of the armour, seems to be because they are inspired with a hope that at long ranges the angle at which the shell strikes, and the movement of the target through the water, will make direct impact difficult and prevent penetration. On the other hand, against the improved torpedo, in its various forms—mines, bombs, etc.—and their carriers, which include not only destroyers and submarines but the latest development of air-craft, much of the armoured protection of the big ship can be of no avail. It is useless to plate barbettes or casemates, or to belt the side, against an attack which will be delivered lower down on the hull. It will be possible, doubtless, to lessen the destructive effect of bombs flung from aloft by the method advocated by Sir Trevor Dawson—viz., by increasing the thickness and giving a larger curvature or whale-back formation to the armoured deck. To minimise the explosion of a mine recourse must be had to further internal sub-division and protective bulkheads. Nevertheless, these precautionary measures will not keep away the danger, and the bursting of high explosives, either against the curved deck or the hull below water, will almost certainly result in a breach. Only the gun, then, can fend off the torpedo-carrier, by destroying it before it can arrive at a decisive range. At present the gun for this purpose is carried in the battleship, but it seems possible that before long what is now called the secondary or auxiliary armament may be placed in separate vessels. The recent decision to discard torpedo-net defence, trusting for safety to high speed, with quick and frequent changes of course, may be regarded as an indication that naval opinion is trending in this direction. There are other signs of a similar character.

Increased protection.

Heavier displacement.

If in the future the big ship should only carry big guns and be armoured sufficiently to keep out big shell, then it may be that her displacement can be reduced. But as matters are, the guns in both the primary and secondary batteries are increasing in size and power, and in some cases in numbers also, while the demand for thicker armour more widely distributed, not to mention higher speed, inevitably means heavier displacement. This tendency, moreover, is traceable over the whole field of warship construction. Even in the destroyer, which by some is regarded as a moribund type, larger vessels are the rule, and the same is the case with the submarine. When we turn to the actual practice of war, there are no later lessons than those of Tsushima or the other conflicts of the Russo-Japanese War, yet since that time the advance in almost every direction has been tremendous and startling. There may be something to be learnt in its strategic aspects from the sea-grip which Italy, and later on Greece, put upon the Turks, but from such skirmishes as occurred

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little information is to be obtained of tactical value or in regard to the use of the machine in battle. No light was thrown upon the advantages or the limitations of this or that weapon or element of defence. Thus, though there is apparent a general desire to lessen or arrest the burden of expenditure on armaments, there are no very hopeful indications of its accomplishment by a reduction in the size and cost of warships and their equipment. With the introduction of new appliances and novel forms of attack and defence, never was there a time when larger calls were made upon the skill, foresight, and practical experience of naval officers and the designers of the material it is their business to use.

Heavy guns. There appears to be a growing diversity in the practice of the naval Powers in regard to the main armaments of their big ships. It was remarked in this article a year ago that the consensus of opinion among naval artillerists favoured an increase of calibre rather than an increase of numbers. Possibly this may still be true, for the example of Great Britain and Germany, who have both adopted a main battery of eight 15-in. guns for their latest battleships, appears to be regarded as one to be followed by many of the other Powers, but difficulties connected with the manufacture of these larger weapons have prevented their adoption in other cases. Concurrently with the mounting of larger calibres of guns, however, in new battleship types the movement for adding to the number of weapons carried appears to have gained in favour during the year. This movement finds its most advanced expression among the French constructors who have designed a vessel to carry sixteen 13·4-in. guns in four quadruple turrets. This policy, the advocates of which advance the claim that in a given interval of time a number of 13·4-in. guns can deliver as many tons of projectiles as a like number of 15-in. guns, and that it is better to capture a ship than to sink her, is certainly against the trend of opinion of the Dreadnought era. There are no signs at present that it will be generally or even largely adopted on military or tactical grounds.

Great Britain. From the remarks of the First Lord, in his speech on March 17th in the House of Commons, it is clear that the Admiralty have no misgivings in regard to the bold step they took of advancing from the 13·5-in. to the 15-in. gun in the Queen Elizabeth class before trying a weapon of the larger calibre. Mr. Churchill referred to the change as "one of the most important decisions that the Admiralty have had to take for many years." He said:—"Two years ago we knew that other countries had already decided, and had actually begun in some cases, to adopt a number of more powerful weapons than we possessed in the 13·5-in. gun. In the Queen Elizabeth type

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we wished also to have exceptional speed without any loss of gun-power or protection or undue increase in displacement. We had thus to give up one of the five turrets to find room for the extra boiler power, and in order to maintain our gun-power we had to increase the calibre of the guns. Thus we had eight 15-in. guns instead of ten 13·5-in. guns. There is no great difference in cost involved in this. But what is remarkable is that while other countries were debating and experimenting, we acted. We ordered the whole of the 15-in. guns for the ships of the 1912–13 programme without ever making a trial gun. We trusted entirely to British naval science in marine artillery, to the excellence of our gun-making system, and to the quality of British workmanship. When the first of these 15-in. guns was tried, a year ago, it yielded ballistic results which vindicated, with what is to the lay mind marvellous exactitude, the minutest calculations of the designer. It is the best gun we have ever had; it reproduces all the virtues of the 13·5-in. gun on a larger scale, and it is the most accurate gun at all ranges that we have ever had, and as it is never pressed to its full compass by explosive discharge it will be an exceptionally long-lived gun. Its power may be measured by the fact that whereas the 13·5-in. gun hurls a 1400-lb. projectile, a 15-in. gun discharges a projectile of nearly a ton in weight, and can hurl this immense mass of metal 10 or 12 miles. That is to say, there has been an increase of rather more than 30 per cent.—I am purposely vague on this point—in the weight of the projectile for an addition of 1½ in. to the calibre. This increase in the capacity of the shell produces results in far greater proportion in its explosive power, and the high explosive charge which the 15-in. gun can carry through and get inside the thickest armour afloat is very nearly half as large again in the 15-in. gun as was the charge in the 13·5-in."

The 15-in. gun.

The 15-in. gun forms the main armament of the Royal Sovereign class, to which the five battleships of the 1913–14 programme and three of those of the 1914–15 programme belong. From the tables of ordnance which appear elsewhere, full particulars in regard to the 15-in. gun will be obtained. It will be noticed that the Elswick ordnance table, in addition to containing a 15-in. gun of 45 calibres, like the Vickers and Coventry lists, has also a 15-in. 40-calibre gun, while Messrs. Beardmore and Co. include in their table a 15-in. gun of 42 calibres. There are also differences to be noted in other respects between the weapons of these firms. In regard to the weight of the 15-in. projectiles, for instance, the Beardmore weapon fires a shell of 1850 lb., the Elswick gun one of 1920 lb., while the Vickers and Coventry guns have projectiles of 1950 lb. The

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weight of the gun likewise varies from 90 tons of the Beardmore weapon to the 106 tons of that manufactured by the Coventry works.

Foreign advance.

Whatever the intentions of foreign Powers in the direction of heavier guns for primary batteries, their present position is much behind that of this country. As Mr. Churchill said on March 17th, we shall have ten ships armed with the 15-in. gun by the time any other naval Power has two. The only country which is known definitely to have adopted a 15-in. gun is Germany, but she has no ships afloat yet in which it will be mounted. Three Powers have vessels launched which will carry 14-in. guns, these being the United States, Japan, and Chile, and two more have ships to carry 13·5-in. or 13·4-in. guns, these being Turkey and France; but the latest vessels put afloat for Germany, Italy, Austria, Russia, Spain, Argentina and Brazil mount 12-in. guns. As to prospective developments, the most striking is the project to mount eight 16-in. guns in the next American battleships.

Germany.

It became known in July last that the German battleships and battle-cruisers of the 1911–12 and 1912–13 programmes did not mount a heavier gun than the 12-in., but that the Ersatz Wörth and T, of the 1913–14 programme, were to carry eight 15-in. guns. The prolonged adherence of the Germans to the 12-in. gun came rather as a surprise, but it was not a new thing for them to keep to a small gun which had proved satisfactory instead of adopting promptly a heavier calibre, after the example of Great Britain. They continued to put 11-in. guns into battleships many years after 12-in. guns were being mounted by other countries. The first British vessels to be equipped with 13·5-in. guns were the Orion and Lion, of the 1909–10 programme. Four years were to elapse, however, before Germany relinquished the 12-in. gun. For purposes of comparison, it may be pointed out that of the Dreadnought battleships of the two Powers Great Britain has ten with 12-in. batteries, all complete; twelve with 13·5-in. batteries, ten being complete, and ten with 15-in. batteries, of which two are launched. Germany has four with 11-in. batteries, all complete; thirteen with 12-in. batteries, nine being complete, and two with 15-in. batteries, building on the stocks. Turning to battle-cruisers, the first to mount 12-in. guns in the German Navy was the Derfflinger, of the 1911–12 programme, launched on July 1, 1913. The four earlier battle-cruisers, Von der Tann, Moltke, Goeben, and Seydlitz, have 11-in. guns. The Lützow, Ersatz Hertha, and Ersatz Victoria Luise, of the 1912–13, 1913–14 and 1914–15 programmes respectively, are reported to have a similar armament to the Derfflinger. Germany

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will thus have four battle-cruisers mounting 11-in. guns and four mounting 12-in. guns completed in 1917. Of course, there is no authentic information yet available regarding future vessels, but it has been stated that the battleship of the 1914–15 programme will have the same main armament as the Ersatz Wörth, as will probably the Ersatz Wilhelm II. of the 1915–16 programme; but the two battleships of the next year may have ten 15-in. guns, without increasing the number of turrets, two triple barbettes being substituted for two of the twin ones in the earlier ships.

United States. For the present, twelve 14-in. guns remain the primary battery of new American battleships. The Pennsylvania, of 1912, No. 39, of 1913, and also, it is said, the ship or ships to be authorised in 1914, will have this armament, although an alternative scheme for the last-named gives eight 16-in. guns. Before the Pennsylvania, four battleships carrying ten 14-in. guns were built. The policy of keeping to twelve 14-in. guns for the two next ships to the Pennsylvania and No. 39 would have advantages from the point of view of homogeneity.

France. There is no indication of the adoption of a heavier gun than the 13·4-in. in the French Navy. Three battleships of the Bretagne class to mount this weapon were launched in 1913, and will be followed by the five Normandies, but the latter carry twelve guns as compared with the ten of the former. In the projected battleships of the Tourville class, the number of 13·4-in. guns has again been increased from twelve to sixteen.

Russia. In her four vessels of the Navarin type, authorised under the Fleet Law of June, 1912, Russia has the most powerfully armed battle-cruisers in the world of which there is at present information. Each ship is to have twelve 14-in. guns, or an armament equal to that of the latest American battleships. The manufacture of these large weapons in sufficient numbers will provide plenty of employment for the Russian ordnance works, and the wisdom of the Ministry of Marine in seeking British co-operation in this respect is manifest when the significance of this advance in armament is considered.

Italy. A good deal of uncertainty has attended the reports of Italian armament progress during the year. It now appears that the four ships, lettered G, H, J, K, only one of which it is understood is provided for, will possibly be armed with eight 15-in. guns, like the British Queen Elizabeth class, instead of the ten 14-in. guns with which they were formerly credited. The statement has been made that the 15-in. guns ordered from the Ansaldo firm will be manufactured on the built-up instead of the wire-wound principle.

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This seems rather doubtful, however, especially after the success which attended the wire-wound guns used in the recent war. These guns were all made by Messrs. Armstrong, Whitworth and Co., and it has been reported that the Italian Naval Ordnance Department were well satisfied with their performances. During the whole of the campaign no accident occurred to the naval guns, although 32,046 projectiles were fired from them.

Austria. With Germany and Italy adopting a main armament of eight 15-in. guns, it is not surprising that Austria should do likewise, although until financial provision has been obtained for the four Dreadnoughts in the Second Division, it is always possible that a change of plan may be made. In any case, the advance to a larger calibre than 12-in. must put a tax on the ordnance resources of the Austrian Navy.

Japan. There has been no important advance in regard to Japanese heavy ordnance during the past year, the 14-in. gun being that which is forming the armament of the newest vessels, whether battleships or battle-cruisers. The four vessels of the Fuso type have twelve, and the four of the Kongo type have eight. The 14-in. guns of the Kongo, completed last year by the Vickers firm, are understood to have given satisfactory results on trial and service. On May 14 and 15, 1913, when the gun trials of the Kongo were carried out, 14-in. guns were fired on board ship for the first time.

Minor Powers. Spain has projected a programme which includes three battleships, and it is expected that these will be armed with eight 14-in. guns instead of the eight 12-in. of the España class. There are no new developments as regards the South American navies. Brazil, having sold the Rio de Janeiro, whose design and armament of fourteen 12-in. guns did not harmonise with the Brazilian Fleet organisation, is reported to have decided upon the construction of another battleship in her place, but the order has not been given at the moment of writing, and therefore no authentic particulars can be given in regard to her armament. The two new Chilian battleships Latorre and Cochrane carry ten 14-in. guns each, and it may therefore be expected that these or heavier weapons will be favoured by the Brazilians. The Argentine battleships Moreno and Rivadavia have twelve 12-in. guns.

Turkey has two differently armed battleships now that she has purchased the ex-Brazilian Rio de Janeiro, as her other new battleship, the Reshadieh, has ten 13·5-in. guns. If, too, as has been reported, Greece is to have built a new Dreadnought in France, this vessel's guns may be different, in type of mounting at least, if not in calibre, to those of the Salamis, the Greek battle-cruiser building in Germany,

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with guns made by the Bethlehem Steel Company of America. The multiplication of calibres and types of mounting must add to the difficulties in the way of training guns' crews.

Disposition of guns.

Opinion in regard to the most effective method of disposing the heavy guns on board ship, to judge by current practice, would seem to be still divided and unsettled. Triple turrets are evidently decreasing in favour now that fewer and larger guns are being mounted. The French, however, are reported to have the intention of continuing the system of quadruple turrets which they adopted for the first time in the Normandie class of the 1913 programme. In his paper on "Some Questions Relating to Battleship Design," read at the spring meeting of the Institution of Naval Architects, Mr. T. G. Owens said that the advent of triple and quadruple turrets on the Continent and in the United States may possibly produce some effect on future warship designs in this country. "Considerations of weight," he said, "space occupied, and the limitation of the number of turrets to be controlled, favour their adoption. The practical objections lie in the increased turning impulse due to the greater distance of the side guns from the centre of the turret, in the maintaining of a uniform supply of ammunition, and in the 'too many eggs in one basket' idea. Undoubtedly the first of these objections was at one time looked upon as the most serious because in simultaneous firing a difference of the fractional part of a second in the ignition of the gun charges would produce for the following projectile considerable lateral deviation from the target. The relative values of this turning impulse were published about two years ago in the *Rivista Marittima*, which stated the angle of rotation for guns in the same horizontal plane to be for twin-gun turrets 2 deg. 20 min., triple-gun turrets 4 deg." At the same time, it is to be noted that Mr. Owens clearly indicated that the Italians had overcome these difficulties, and there appears to be reason for believing that in Austria and the United States the trials of similar mountings have proved perfectly satisfactory.

End-on fire.

In the same paper, Mr. Owens favoured the placing of all the primary guns with their axes approximately at the same height above the water-line, as facilitating the work of those responsible for getting in the largest number of hits in the shortest possible time. Although this would mean the adoption of a flush-decked ship, having an end-on fire from the guns of one turret only, it was suggested that this would not detract from the value of the design, as end-on fire is now at a discount. Signor Orlando took the view that, as between the two types, he could see no reason why the flush-decked ship should be preferred. Both types had the same fire on

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the broadside, but the type with the heavy gun turrets at different levels had end-on fire of double intensity. Mr. Owens, however, stated in reply to this argument that head-on or end-on fire was considered useless by naval officers nowadays. In illustration of the decline of such fire in the British Navy, it may be pointed out that the original Dreadnought can train three out of her five turrets either ahead or astern, and the Neptune three ahead and four astern. All the 13·5-in. gun ships, however, whether battleships with five turrets or battle-cruisers with four, train only two turrets ahead and astern. They have all their turrets on the centre-line, with the second from either end raised to fire over the first. It is understood that a similar plan is followed in the Queen Elizabeth class. German practice has followed that of Great Britain. In the United States, all Dreadnought designs have provided for two turrets, one firing above the other, to be trained directly ahead or astern, as the centre-line method has been rigidly adhered to. In France, the Jean Bart type allowed for no less than four turrets ahead and astern. There were two superposed turrets at either end of the vessels, and two wing turrets amidships. But in the Bretagne class, where the centre-line method was adopted, only two turrets were allowed for end-on fire. The Normandies have only three turrets, of the quadruple type, and of these one can be used ahead and another astern. The Austrian, Italian and Russian ships with four three-gun turrets, fire only one of them ahead or astern. It is particularly interesting to note, however, especially in view of the partiality which Signor Orlando appeared to express for end-on fire, that the Conte di Cavour is better off in this respect than the Dante Alighieri. Instead of the one turret with three guns which the latter can use, the Conte di Cavour has available one triple and one twin turret, the latter being raised to fire over the former. Of course, end-on fire had necessarily to be decreased when the centre-line method of distribution was adopted, and in most of the battleships now building only two turrets, one firing above the other, are capable of being trained directly ahead or astern. What appears to be the first ship in which triple turrets are superposed in this fashion is the American Pennsylvania. In this ship six guns from two turrets can fire ahead or astern, or as many as were obtained in the original Dreadnought by placing two turrets off the centre-line of the ship.

Battle-ship design.

Among other questions relating to battleship design which were discussed in the illuminating paper read by Mr. T. G. Owens, to which reference has already been made, were those connected with a possible increase in the size and weight of the heavy guns. From this source most of the following information has been taken.

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The problem, as Mr. Owens tells us, must be considered in association with the character of the armour and protection afforded the present day battleship and the probable decisive battle range at the time of the vessel's design. The 12-in. gun reached its highest efficiency at a length of 50 calibres and when the 850-lb. projectile was given a muzzle velocity of 3000 ft. per second. Further advance in the power of the individual gun became possible only by the introduction of guns of larger calibre; with these the necessary muzzle energy at great ranges is attained in association with a lower muzzle velocity. Comparison of these guns with each other and with the 12-in. 40-calibre type, contemporary with the Russo-Japanese War, is furnished by the following table:—

Type of Gun.	Weight of Projectiles. lbs.	RANGE. 5000 yards. Length of Danger Zone. Yards.	5000 yards. Penetration of K.C. Armour. Inches.	8000 yards. Length of Danger Zone. Yards.	8000 yards. Penetration of K.C. Armour. Inches.	10,000 yards. Length of Danger Zone. Yards.	10,000 yards. Penetration of K.C. Armour. Inches.
12-in. 40-cal.	850	153	13½	70	10·0	—	8·25
12-in. 50-cal.	850	272	19·5	124	16·1	89	14·25
13-in. 45-cal.	1250	—	19·4	98	16·1	—	14·25
14-in. 45-cal.	1400	217	21·7	110	18·5	76	16·5
15-in. 45-cal.	1950	193	23·5	100	20·5	72	18·8

The effect of the high muzzle velocity of the 12-in. 50-calibre gun, and consequently of its flattened trajectory, is shown by the length of its danger zone at various ranges. If this and the rate of the firing were only the criteria of the value of a gun, opponents of higher calibres would have some justification for their adverse criticism. What can be considered as the decisive battle range to-day? Assuming that this was 5000 yards in the Russo-Japanese War, the length of the danger zone is 153 yards approximately. If curves of length of the danger zone be plotted to a base of range for the 12-in. 50-calibre and 15-in. guns, then the corresponding length of zones for these guns is found at 7200 and 6000 yards respectively, but if the improvements in range-finders and sighting mechanism tending to a higher percentage of hits be taken into account the range will probably reach a higher figure still.

Fighting ranges.

Another important factor in the determination of fighting range is the increased accuracy of the later torpedoes at longer ranges. In the Russo-Japanese battles the range was from 3500 to 4500 yards. The torpedo is to-day probably efficient at ranges of from 6000 to 7000 yards. With these facts in mind it may reasonably be assumed

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that, given good weather conditions, the decisive battle range of to-day lies in the region of 8000 yards.

Heavy gun positions.

Examination of the published data for the most recent battleships shows that, in the light of the foregoing table, the United States alone have provided adequate protection for heavy gun positions and conning tower, but even in their case the main belts in no case exceed about 14 in. Certain authorities state that, under favourable weather conditions, the extreme fighting-range will hardly exceed 10,000 yards; it will more generally approach 9000 yards. Even at the maximum range the guns of to-day appear sufficiently powerful to penetrate the protection at all positions of the battleships of all the Powers, with the exception of the United States. From this point of view, then, the introduction of calibres above 12 in. may have seemed unnecessary; incidentally, on the other hand, if larger guns were used, the main armour belts, etc., should have been greatly increased in thickness. If this be impracticable, some contend that they should be reduced to a thickness only sufficient to resist successfully the fire of the secondary armament.

On the other hand, the increased angle of descent due to greater range, the inclination of the axis of the shell to its trajectory, with its powerful cross-breaking effect on the projectile, and the relative position of the opposing ships, all tend to make normal impact practically impossible and successful perforation most difficult, even with the armour of less thickness than that indicated in the table. In the Russo-Japanese battles no case of serious damage to the main waterline belt or to the fixed armour of the heavy gun positions was reported, in spite of the facts that at the decisive battle-range of 5000 yards the 12-in. gun was theoretically capable of penetrating 13½-in. armour, while the protection of the warships engaged did not exceed about 9 in. Again, in the American trials, 12-in. armour-piercing shells, without bursting charges, fired at a range of 8000 yards, penetrated armour plates of 8 in. and 10 in. thickness, but all projectiles were broken in piercing the plate, and, therefore, an explosion inside the armour could not have resulted.

Penetration of armour.

The introduction of the 4-calibre point projectile, with special head caps producing a much improved form for air resistance with a considerable gain in range, speed, and, therefore, in penetrating power, failed to arrest the movement towards higher calibres. Augmented weight of shell and greater explosive effect without increased calibre did not commend itself to gunnery experts, because of the disadvantage of increased wear of the gun.

These factors, with a possibility of still greater fighting-ranges ollowing the rapid advance of the torpedo—French writers already

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The problem, as Mr. Owens tells us, must be considered in association with the character of the armour and protection afforded the present day battleship and the probable decisive battle range at the time of the vessel's design. The 12-in. gun reached its highest efficiency at a length of 50 calibres and when the 850-lb. projectile was given a muzzle velocity of 3000 ft. per second. Further advance in the power of the individual gun became possible only by the introduction of guns of larger calibre; with these the necessary muzzle energy at great ranges is attained in association with a lower muzzle velocity. Comparison of these guns with each other and with the 12-in. 40-calibre type, contemporary with the Russo-Japanese War, is furnished by the following table:—

Type of Gun.	Weight of Projectiles. lbs.	Range.					
		5000 yards.		8000 yards.		10,000 yards.	
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speak of an effective range of 9800 yards—probably determined the supersession of the 12-in. gun. Among the advantages of the higher calibres, too, are the reduction in muzzle-velocity without loss of penetrating effect, the greater chance of the shell piercing the armour, and of the explosion of the contents taking place inside the hull, and the greatly increased weight of explosive which can be carried in the armour-piercing shell, possibly rendering only one type necessary.

It seems to be generally agreed that the primary gun and its projectile should be of the smallest calibre and weight necessary to carry an efficient bursting charge through the maximum thickness of protecting side armour on a ship of a possible enemy at the range of maximum vision, and it should, at the same time, possess the greatest possible length of danger zone without unduly affecting the life of the gun. This being the case, there appears no great necessity in the present or in the immediate future for guns of larger calibre than 14 in., which at about 12,000 yards, according to the Gavre formula, and allowing for angle of descent, should pierce the best Krupp armour of a thickness of 14 in., and deliver a bursting charge to the interior of the ship of 35 lb. Yet, as Mr. Owen points out, guns of larger calibre than 14 in. are already mounted, and a further increase is not beyond the bounds of probability.

Hydraulic *v.* electric power.

In the *Naval Annual* for 1908 some observations were made on the important question of hydraulic *versus* electric power as applied to the operations connected with heavy gun-mountings. After summarising the arguments for and against each form of prime mover, it was said that, despite the very obvious advantage of having only one form of power to deal with, it was nevertheless of the highest importance that the system of power for working the guns should be thoroughly sound and trustworthy, and these qualities are present in a marked degree in the hydraulic system, if well constructed, as compared with the electric form of power. It was in the same year that it was decided to make a trial of electrically-operated gun-mountings in the Invincible, and now, after about four years of unsatisfactory working and frequent adjustments, it has been decided to abandon the electric mountings for the more reliable hydraulic system. Electricity is most convenient in its application to passenger lifts, hoists, and many similar operations; but for gun-mounting work, especially in the heavy turrets now fitted to our modern battleships, it has proved to be too delicate and uncertain to cope with the heavy duties imposed upon it. The violent and shattering disturbance set up when the guns are fired appears to put too great a strain on the electrical gear, no matter how substantially constructed it may be, and it is certain that, in order to make the experiment as complete as

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possible, the Admiralty specification called for every detail which experience has shown can with advantage be used with hydraulic mounts. Something, however, is required more definite in its functions, more to be relied on, always to act with certainty even in the event of a breakdown, and with which, if any trouble does exist, the conditions will readily disclose themselves. Hydraulic power would seem to be eminently suitable to meet these requirements. Another vital point in connection with electricity is the difficulty of localising or analysing the exact position of a defect. The trouble may be due to some short-circuiting in the cables or the motors, or other electrical devices may be at fault, and when the multiplicity of the various elements is considered, the safety contrivances, cut-outs, and other fittings which are necessary for the complete working of the gear, it will be readily understood that the detection of a defect is anything but easy. With hydraulic gear, on the other hand, the power required to move the various parts of the machinery can be more directly applied, and with greater simplicity. The relatively slow moving press, with its simple construction, is peculiarly suitable for most of the duties required to be carried out, and can be applied without the intermediary of gearing, inseparable from electric appliances with a fast running motor.

Disadvantage of electricity.

Even with operations such as in the training of the turrets, where a revolving motor is most readily used, the motor constructed for hydraulic working has many advantages as compared with the electric drive. It is practically impossible to obtain a wide range of speed and reverse from the electric motor direct, making it necessary to provide some intermediate form of transmission, generally that of the variable speed gear, now commonly in use in the United States Navy. But with the hydraulic motor large variation of speeds is easy and simple. It is also possible to regulate the speed to such a nicety that a rotative movement of the turret can be obtained which is virtually invisible to the eye. Nor is there any difficulty found in obtaining a reverse movement with the hydraulic motor. All that is required is to reverse the flow of the pressure-water from the control valve to the motor.

It seems likely that, not only in this country but abroad, the change which is being made in the Invincible will be followed. There is some evidence that certain continental governments have recently altered their system of power as applied to heavy turrets, and it is believed that others are contemplating a similar change, thus further demonstrating the superiority of the hydraulic over the electric system for this kind of work.

Secondary batteries.

There is a steady development to be noted in regard to the

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auxiliary armaments of battleships and battle-cruisers. These are increasing in effectiveness just as are the primary batteries, but it is in the number of guns rather than the size and power of individual weapons that recent advance has been made. For the British Navy, the Iron Duke and Queen Elizabeth classes carry twelve 6-in. guns. The Royal Sovereigns will carry sixteen, presumably behind armour, as are those of the earlier types. In America, the new battleship No. 39, just begun, will have twenty-two 5-in. guns, like the Pennsylvania, or one gun more than the Nevada and Oklahoma. The outstanding feature in regard to the secondary battery of the Nevada type is that it appears to be unprotected by armour on the ship. It is in reference to this fact, and to the ends of the vessel being also unarmoured, that these ships have been spoken of as embodying a new idea in regard to protection, summed up in the phrase "everything or nothing." The main armour belt, of course, is very thick, being 13½ in. amidships, while the triple turrets have a maximum thickness of 18 in., and the twin turrets 16 in., the latter being also the thickness of the armour on the conning tower. It has been said that if the lighter guns required protection it should be of the thickest possible kind. Plates of a thickness approximating that of the calibre of the guns in the secondary battery, such as have recently been adopted, are held to be only sufficient to explode shells from the larger guns, which, were there no protection at all, would pass right through the battery, exploding where they could do little or no damage to the lighter weapons and their crews. It will be interesting to see whether other nations follow the American lead in this direction. There is no evidence at present that such is the case. The abolition of armour for the secondary battery has an important bearing on the question of its disposition. As will be seen from the plan of the Nevada, her 5-in. guns are distributed more widely than those of the New York and Texas. It is not a new principle to abolish the armour for these guns, as in the original Dreadnought and her immediate successors in the British Navy they were unprotected.

Mixed batteries.

In regard to the number of guns in secondary batteries, the *minimum* and *maximum* figures for ships building are represented by the British Iron Duke and Queen Elizabeth classes, which have twelve 6-in. guns, and the French Normandie class, which has twenty-four 5·5-in. guns. When the Queen Elizabeth and her sisters are completed, the smallest number of guns mounted in this connection will be sixteen, the number carried in the Royal Sovereign class. In France, the adoption of the 6-in. gun in place of the 5·5-in. gun has been advocated. In addition to its heavier shell—100 lb. as

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compared with 80 lb.—it is held to be more accurate and efficient at long ranges, and since there is a growing feeling that the secondary batteries will prove their use in fleet actions, the 6-in. weapon is favoured for this reason also. In Germany, sixteen 5·9-in. guns will be mounted in the Ersatz Wörth and T as compared with fourteen in the Konig type. It appears to be uncertain whether the same number of 3·4-in. guns will also be mounted. The adoption of a mixed secondary battery has been mainly confined to the German Navy. It may, however, become more general now that anti-air-craft guns are being carried. The Iron Duke—the first British ship to mount such weapons—has two 3-in. A.A. guns, a number which will probably be increased later on. As described elsewhere in this section of the *Naval Annual*, mountings have been designed whereby such guns may be used either against air-craft or torpedo craft. It should therefore be possible to increase the number of anti-air-craft guns without decreasing the effectiveness of the battery available for anti-torpedo defence.

Although the British Admiralty have fallen into line with other maritime Powers respecting the fitting of secondary guns, it does not follow that all authorities are now agreed on its necessity. Difference of opinion still exists, and much might be said on both sides. Granting the desirability of an auxiliary armament to repel torpedo-boat attack, it is preferable to employ the largest man-handled quick-firing gun manufactured—viz., 6-in.—to serve not only the purpose stated above, but also because the decisive battle range may lie within reach of the 6-in. gun. The horizontal protection of warships is weak compared with that in the vertical direction. These guns fire much more rapidly than those of higher calibre, discharging five to eight times the number of projectiles in a given time, hence the volume of fire is very great and, properly directed, is capable of producing widespread destruction over the decks of an adversary. Auxiliary armaments.

In the case of torpedo-boat attack where the battleship and torpedo-boat are travelling towards each other, their relative rate of motion is the sum of their respective speeds, say, $20 + 30 = 50$ knots. Hence it is necessary to have as large a volume of fire in the direction of approach as possible in order to prevent the torpedo-boat reaching the ship. The number of guns firing aft may be limited as the relative rate of approach is $30 - 20 = 10$ knots, and more time is given the gun-layers to get in a large number of shots.

Assuming that the main object of these guns is to act against torpedo-craft, it is essential to give them as high a command and clear vision as can be arranged for. At the same time this should Mounting auxiliary armaments.

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not be exaggerated, as undue height leads to a very large expenditure in the weight of structure and protection and to an increased target. They should also be as numerous as the conditions of displacement and accommodation will allow. In all modern battleships these guns are being placed in citadels on the upper deck level, the most approved system being to arrange the citadel extending from the aftermost turret on the foremost heavy guns to the foremost turret of the after heavy guns; and in the case of ten-gun ships to raise the amidship turret so as to fire over this citadel. This arrangement allows the guns to be placed so as to ensure that no area of water in the complete circle is left without one or more guns capable of firing over it. The guns are, as a rule, arranged in embrasure ports to ensure this effect. In some ships it is noticed that instead of the battery being continuous between the line of turrets it is broken up into two separate batteries—one arranged immediately in rear of the foremost heavy gun and one immediately forward of the after heavy gun. There is not much to choose between either of these systems as regards command of fire, but the continuous citadel lends itself better to the supply of ammunition and to the control of fire.

Disposition of secondary batteries.

It cannot be pretended that any satisfactory solution of the mounting of the auxiliary armament has really been attained. These arrangements can only be considered as a compromise, as the armour, which it is possible to arrange for protecting the guns, is quite insufficient for its purpose, offering comparatively little resistance to the projectiles of the heavier artillery.

The alternative is to place the auxiliary guns in turrets. This as a general rule would necessitate, on account of weight, the guns being placed in pair turrets. Thus a sacrifice has to be made, as it cannot be supposed that the rate of fire will be so rapid as that obtained from the single served gun mounted in a citadel, but, on the other hand, it is possible to increase the thickness of the armour protection, and also the curved armour of the turrets has greater resisting power with equal thickness than the straight upright armour of the citadel. In designs of ships prepared by the Armstrong firm, we find that both systems are in use, which is only natural, considering the differences of opinion on this subject which exist amongst naval officers of the numerous nations with which the Armstrong firm deals.

Gun-mountings.

As to the gun-mountings themselves, many improvements have been introduced, and it is not going too far to say that they would now seem to have arrived at a pitch of excellence which allows of little further useful alteration. This subject has been studied in such a fashion as to ensure the quickest possible service of the

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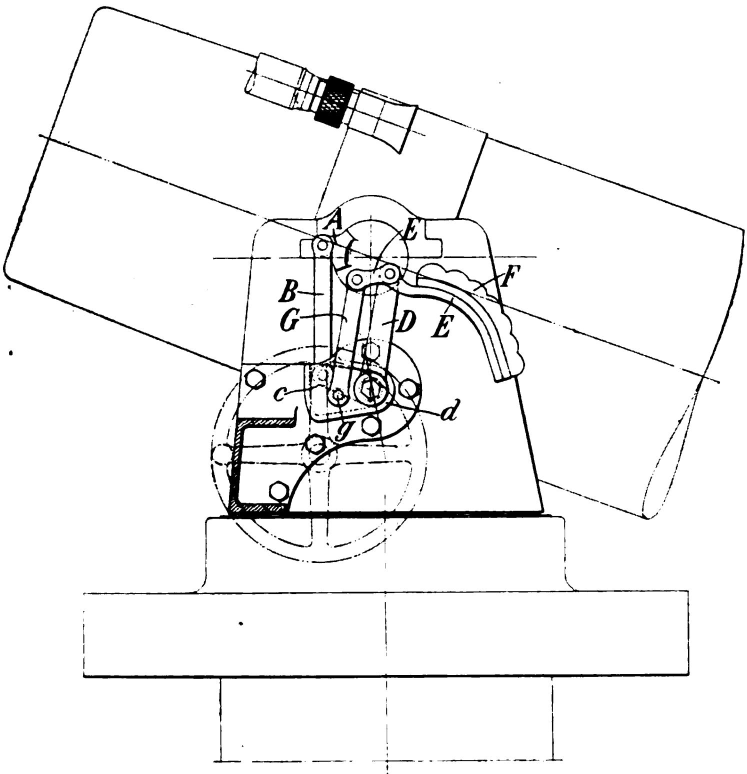
ammunition being obtained from the magazine to the gun, and, indeed, from the magazine until the shot reaches the target. To ensure this result, every detail of ammunition hoist, breech mechanism, sighting, elevating, training, has to be studied in the minutest detail. Such perfection is now required by naval officers in all these particulars that it is not surprising to find that even the smaller mountings have a large amount of most ingeniously designed gear for their efficient working—gear which has to work with the accuracy of a clock. Neither is it surprising that the cost of these equipments



MESSRS. BEARDMORE'S BREAST-REST FOR LIGHT GUN-MOUNTINGS.

has risen to such an extent that they are almost double that with which the naval world was content to be provided ten years ago. Accuracy and perfection of workmanship cannot be obtained without paying the price in any piece of machinery. Naval guns and gun-mountings are not exceptions to this general rule.

In connection with the improvement in efficiency of hand-worked gun-mountings, due to the eye-piece of the gun-layer's telescope being brought to the trunnion of the gun-cradle, or very close to it, the Beardmore firm have patented a new form of breast-rest for use in **Beardmore breast-rest.**

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the lighter gun-mountings, in which the gun-layer stands on the deck and has to accommodate the position of his head to the varying angle and position of the eye-piece; the breast-rest is so designed that its movement synchronises and exactly copies the movement of the eye-piece. This arrangement is illustrated on the preceding page, and is thus described:—

To a lug A on the trunnion is attached a link B, actuating a bell crank C D, which revolves in a bearing d on the side of the mounting. At the upper extremity of the vertical arm D of the bell crank is pivoted a lever E, which towards the rear side carries the breast-rest F, and towards the front is attached to a link G, which pivots about a bearing g attached to the mounting.

Any vertical movement of the link B due to rotation of the trunnion thus, through the bell crank and the link G, produces in the breast-rest a motion copying that of the eye-piece of the telescope.

Ammunition hoist.

The technical staff of Sir W. G. Armstrong, Whitworth & Co., Ltd., are constantly evolving improvements in the details of heavy gun-mountings, as the constant experience of the firm in dealing with hydraulic and other gun-mounting mechanisms points out to be improvements. Needless to say, these are generally most ingenious devices. A notable example is one for facilitating the transfer of projectiles from one loading-tray to another, so as to ensure the least amount of jar to the projectile. In the older system the projectile was allowed to fall some distance when passing from one loading-tray to another, especially in the case of loading the ammunition hoist at the bottom of the trunk.

The device now adopted by the firm is a tray on which the projectile is carried, having a collapsible side consisting of toggle levers pivoted to the tray. When the tray has arrived at the position at which it is desired to transfer the projectile, the tail of one of the levers strikes against a fixed pin, causing the toggle levers to collapse, but a bar along which the tail runs prevents any movement of the toggle levers. The tray of the hoist has a collapsible side adjacent to the collapsible side of the other tray. This side generally consists of levers, one pivoted to the tray and the other pivoted to the other lever and to a block held in its normal position by a spring. When the projectile rolls against one of the levers it causes the levers to collapse against the action of the spring, but when the projectile has reached its proper position in the tray, the spring causes the levers to rise and retain it there.

To ensure the action of the levers a tappet-piece may be carried by the other tray which forces them upwards, if the spring has not done so. Generally, a rod is connected to one of the levers, which, when the levers are depressed, passes through a hole in the plate behind the tray, preventing any movement of the hoist until the levers rise; this rod also prevents any depression of the levers when the

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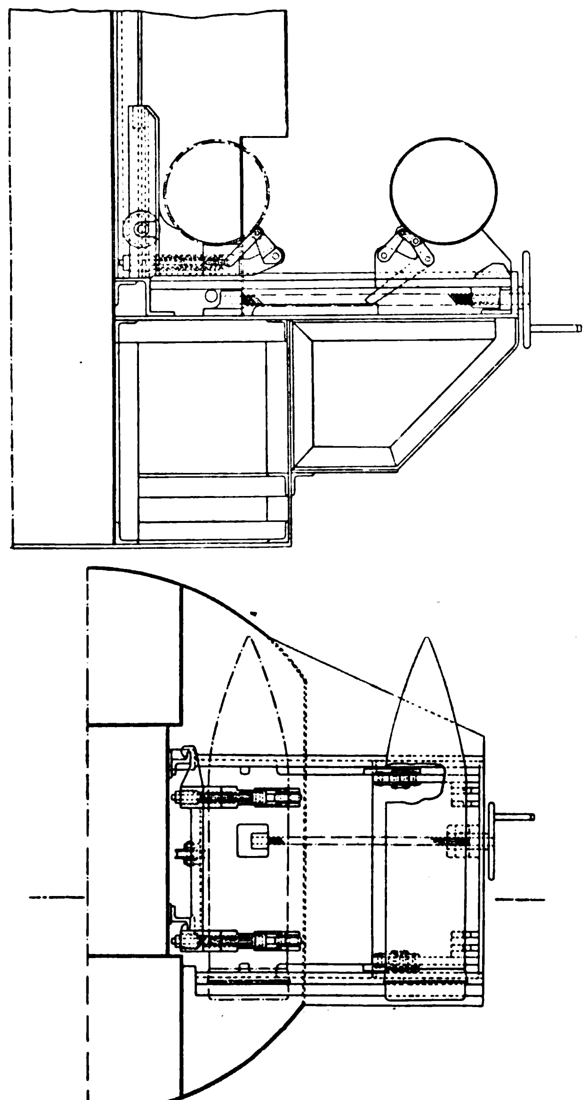
hoist is in motion. The trays are brought into close proximity either by a screw operated by a hand-wheel or by a hydraulic cylinder. The illustration below gives a general view of the apparatus.



Elswick Loading Tray for Heavy Guns.

When the armament of the new oil-burning light armoured cruisers of the Arethusa class became known, it was not surprising that, in spite of their comparatively small size and of the heavy calls on the weight for speed, provision had been made for the mounting Small cruiser armament.

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of two 6-in. guns in addition to eight 4-in. guns. The 6-in. gun appears now to be regarded as essential to a good cruiser armament. It figures in all the British "City" class and in their contemporaries in the Japanese Navy, the Chikuma, Hirado, and Yahagi, completed in 1912. Most other light cruisers of recent date, however, have more nearly resembled the Boadiceas, whose heaviest gun is the 4-in. The German cruisers, from the Kolberg, launched in 1908, to the Regensburg, launched on April 25, 1914, mount twelve 4·1-in. guns; the Italian Quarto class, six 4·7-in. guns; the Austrian Admiral Spaun type, seven or eight 3·9-in.; and the Brazilian Bahia class, ten 4·7-in. No doubt there are advantages in having only one calibre of gun in these vessels. Many authorities appear to consider a numerous battery of small guns capable of very rapid fire the most desirable for a cruiser armament. The questions of range and of the destructive power of individual shell, however, tell in favour of the mounting of some larger guns. It has often been remarked in German newspapers that the light cruisers of the Magdeburg and Rostock types ought to have at least a pair of 6-in. guns, but as these vessels appear to be regarded strictly as scouts, and therefore more in need of speed than of gun-power, they are provided with a dozen 4·1-in. guns. What may be called the two extremes of cruiser armament are to be found in the new French and Russian vessels. Guns of practically the same calibre are mounted in both these countries, but there is a great difference in the size of the vessels. Thus, the three French light cruisers, or *conducteurs d'escadrilles*, of 4500 tons displacement will carry six 5·5-in. guns. The six Russian cruisers of 7600 tons will carry sixteen 5·1-in. guns. It is surprising that the Russian vessels are not to mount a gun of heavier calibre than this. A pair of 8-in. guns, with eight or ten 6-in., may appear to some naval men as a much more effective armament. This was the armament of the Bayan and Pallada, launched in 1906–7. While there may be virtue in numbers, the sixteen 5·1-in. guns of the Admiral Grieg type will be useless at ranges at which even one 8-in. gun could have been capable of inflicting a good deal of damage. Much must depend, of course, upon the function these cruisers are intended to fulfil.

Bow and stern chasers.

Like the French cruisers, the ex-Chinese vessel Fei Hung, now purchased by Greece, is heavily armed for her size. Displacing only 2600 tons, or slightly less than the British Sentinel class, the Fei Hung carries two 6-in. and four 4-in. guns. Although built at Camden, New Jersey, by the way, this vessel has an Elswick armament, and her gunnery trials were carried out in American waters under the supervision of representatives of Messrs. Armstrong,

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Whitworth & Co. The value of a 6-in. gun in cruisers lies not only in its greater smashing power against hostile destroyers and other small craft. It can also be of value against the unarmoured portions of bigger ships which attempt to stop the light cruiser in which it is carried. The two 6-in. guns in the Arethusa class are mounted for use as bow and stern chasers. The weapon mounted forward can thus stop a retreating destroyer at a range which would be too great for 4-in. guns; while the after gun should be capable of inflicting damage to the bows of a pursuing battleship or other big ship to a much greater extent than any number of 4-in. guns, on account of their inferior range and power. In his recent lecture before the Institution of Naval Architects, Mr. T. G. Owens referred to this point. Discussing the armour protection of battleships, he said that "the need for increased height of armoured end protection forward was established in the last great naval fight; the unarmoured forward ends of some of the vessels were completely riddled by quick-firing guns, with the result that the protruding and jagged steel plates, and the inrush of water as the vessels tried to steam ahead, made the ships practically unmanageable."

Guns for destroyers.

Since the Acasta class, or the K class, as they are officially known, of the 1911–12 programme, three 4-in. guns have been the standard armament of British destroyers. This is a great advance upon the one 12-pdr. and five 6-pdr. weapons which were being put into destroyers ten years ago. Bearing in mind, too, the increase in speed and sea-keeping qualities during that period and the developments in the torpedo armament, the amount of weight devoted to gun-power is notable. The newest German destroyers about which information is available, those numbered 25 to 36, of the 1913–14 programme, carry two 15-pdr. guns, and are therefore much weaker in this respect. In France, the armament of the new destroyers of the Magon class is two 3·9-in. and four 9-pdr. This is of about the same power as that of British boats, which can throw a weight of metal of 93 lb. from their 4-in. guns, as compared to the 92 lb. of the French vessels. The new Russian destroyers carry three 4-in. guns, their combined weight of metal being thus about the same as the French boats. A comparison of the British with the French and Russian practice raises the question as to whether it is the better plan to mount two large and two small guns in a destroyer or, say, three large guns. In its way, this is the Dreadnought or all-big-gun one-calibre idea on a smaller scale, and no doubt many of the arguments for or against it as embodied in battleships could be applied here. It may be noted that British designers have tried both plans during recent years, and to judge by

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what they are now doing have decided in favour of one calibre of gun only. Thus the G class (Beagle type), authorised in 1908–9, had one 4-in. and three 12-pdr.; the H and I classes (Acorn and Acheron types), authorised in 1909–10 and 1910–11, had two 4-in. and two 12-pdr.; and the K and L classes, authorised in 1911–12 and 1912–13, had three 4-in. The British 4-in. gun fires a projectile of 31 lb. at a muzzle velocity of 3000 f.s., weighs 2 tons 1–2 cwt., and can penetrate about 17 in. of wrought iron plate at the muzzle. In each of these respects it shows a great advance over the old 4-in. guns of about 15 years ago, but such is the improvement in the mechanism for handling and firing that about the same number of rounds, fifteen, can be fired each minute.

Destroyer armaments.

In the destroyer armaments of foreign navies other than those mentioned, the desire for increased offensive power appears to be general. The newest Italian destroyers in service have one 4·7-in. and four 14-pdr. guns, which would be capable of discharging 100 lb. of shell if they could all be fired simultaneously in one direction. This is more than the 93 lb. of metal thrown by the new British destroyers. The Austrian destroyers completed or completing at the Danubius Works, Fiume, go even better, for they carry two 3·9-in. and six 11-pdr., which can discharge about 123 lb. in one round. As to Japan, in which country destroyer construction has not been so vigorous lately, only two boats being completed both in 1911 and in 1912, and none in 1913, those passed into commission in 1911 have two 4·7-in. and five 12-pdr. guns, being able to fire a combined weight of metal of 150 lb.; while the two 1912 boats, which are much smaller, have one 4·7-in. and four 12-pdr., which could throw 93 lb. at one discharge. In the United States the destroyer armament favoured is four 4-in. guns, which is the same as that of the special boats Swift and Novik in the British and Russian navies, the weight of metal thrown being 124 lb. There remains the class of six fine vessels completed or completing for the Chilian Navy by Messrs. White, of Cowes, in each of which six 4-in. guns are carried. The Almirante Lynch and her sisters, which are not, relatively speaking, so very large—their displacement being only about 1500 tons, as compared with the 2170 tons of the Swift—are thus easily the most powerfully-gunned destroyers in the world at the present time. They are well ahead of their contemporaries in other navies, but reviewing the general tendency it would not be surprising if in the next few years destroyers of equal power became common. This is assuming, of course, that the type survives, because, as Mr. Churchill has said, the functions of the destroyer are being usurped by the small cruiser on the one hand and the large submarine on the

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other, and "it is possible that future years may witness further reductions in the destroyer programme to the advantage both of light cruisers and of submarines." So far as the primary purpose of the destroyer is concerned—its ability to cut down and drive from the sea by gun-power the torpedo craft of an enemy—a great development has taken and is taking place. This development, moreover, cannot fail to have its effect on light cruiser design. For use against the much larger and more powerful destroyers now favoured, the offensive power of light cruisers must be increased. It is somewhat significant that the developments in cruiser and destroyer armament apparently find less favour in Germany than elsewhere. As has been shown, neither the new German light cruisers nor the destroyers are provided with as much gun-power as their contemporaries in other fleets. This may be due to increased speed and fuel endurance on the one hand and to a greater trust in the torpedo on the other.

Submarines. The United States and Germany have followed the lead of Great Britain and Russia in giving their submarines an armament of guns as well as torpedoes. The weapon in the British boats of the E type is understood to be a 3-in., and this is the calibre favoured by the Americans, who were reported to have given their first order last year for twelve 3-in. submarine guns. The weapons were to be mounted after the style of those in the British boats, being elevated and lowered into the hull, while it was arranged that a portion of deck plating should serve as a shield for the gunners during the time the weapon was in use. In Germany two calibres of guns have been placed in submarines, the larger of which is a 14-pdr., mounted on a disappearing contrivance, like those in the British and American boats. The other weapon, however, a 1-pdr., is stated to be fixed, and experience has shown that it does not suffer from being exposed to the sea-water when the vessel is running submerged. Both types of gun are on high-angle mountings for use against air-craft, and it is stated that the 14-pdr. can be brought into action within a minute of the vessel's coming to the surface.

Torpedoes. There is not a great deal to be said about the torpedo development, because in this department it is especially necessary to be reticent. In referring to the submarine, when introducing the Estimates on March 17th, the First Lord spoke of the "increasing range and accuracy of its fatal torpedoes," and these are the two most important qualities in which this description of war engine has advanced in the last few years. Every nation has now adopted the superheated gyroscopically controlled type in some form or another, generally with a diameter of about 21-in. There appears, however,

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to be some difference in the amount of the bursting charge used in the various navies. In a German publication it has been stated that their 21-in. Schwartzkopf torpedoes carry a charge of 290 lb., but the charge in the Elswick machines is 330 lb. Mr. Churchill, in a speech made last year, said that the increased power and size of the new and more expensive torpedoes had led to an increase in the number of torpedo tubes, and the increased facilities for firing them had made it necessary to increase the supply of the more expensive torpedoes which have to be provided for use in each particular tube. The new torpedo is understood to cost 75 per cent. more than the old. It is not only in the torpedo craft proper, but in all the bigger ships of late construction, that a larger number of submerged tubes have been provided. Mr. Owens, in his paper on ship design, after referring to the fact that the effective range of the torpedo is now nearly as great as that of the gun, suggested that in the most desirable ship as many broadside submerged torpedo-tubes should be fitted as space can be found for, within the limits of the dimensions, and preferably not less than three on each broadside. In the discussion which followed Sir Cyprian Bridge, criticising this point, said :—

Torpedo *v.* gun.

"In the paper, the efficient use of the present-day torpedo was allowed for up to 7000 yards. At this range armour much thicker than 14-in. could be penetrated by the 12-in. 50-calibre gun, and judging by the tables in Brassey's *Naval Annual* by an even lighter piece. As the desirable battleship was to carry six torpedo-tubes, the question arose: Was she to be manœuvred to use them as she undoubtedly would be to use her guns? If she was to be manœuvred to use her torpedoes, the value of the thick armour would apparently disappear, at all events, as soon as the effective torpedo range was reached. The present-day torpedo had, it was believed, a velocity that would enable it to reach an object 6500 yards distant in a little over four minutes. A projectile fired from a 12-in. 50-calibre gun could reach an object at that distance in about 9 seconds. The gun in question could be fired so as to admit of her projectile reaching the object at least six times before the torpedoes got there, although the gun firing did not start until the discharge of the torpedoes had taken place. The ship, as described in the paper, would have three torpedo-tubes on a broadside, and not one heavy gun only, but eight heavy guns. Consequently, if all three tubes were discharged, there would be time to fire forty-eight gun projectiles, all capable of reaching the object before any of the torpedoes could reach it. Suppose we allowed 66 per cent. of misses for the guns, there would still be sixteen hits, against which neither the belt armour nor the gun position armour would afford a real protection;

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and when the torpedoes got there they would find that the work they were meant to do had been already done."

Torpedo nets.

It was in this connection also that Sir Cyprian Bridge, referring to the influence of the torpedo on design and to the necessity for the protection of the battleship against under-water explosion, submitted to the meeting that it would be worth while to consider the advisability of further subdivision. The protective principle, he advanced, would remain in reality unaltered, if we were not only to go on dividing the interior of the ship, but also to go a step further, and divide the ship herself, by distributing her displacement among more units than one. The problem of how to meet the attack of the torpedo when delivered at night in the destroyer, or by day in the submarine, is, indeed, generally admitted to be among the most perplexing of those offered for solution in the present day, whether it is referred to the naval architect in his consideration of ship design, or to the naval officer in regard to tactics. During the year the nets provided for defence have again been discarded, although it might perhaps have been expected that in view of the paucity of harbours on the East coast which are torpedo-proof, and the added menace of the submarines, these adjuncts would have been lengthened rather than abandoned. The considerations which have influenced the authorities in this matter have not been officially explained.

Torpedo-tubes.

The Elswick side-loading 21-in. torpedo-tube has already been described in an earlier issue of the *Naval Annual*, but since then it has been considerably modified, and is now operated by means of hydraulic power instead of, as heretofore, by electricity. The power is drawn either from the ordinary hydraulic supply of the ship or, as an alternative, from a small electric or hand three-throw pump, one of which is provided for each torpedo room. By means of this pump any pressure up to 1500 lb. per square inch can be obtained, and the pump when operated by hand by four men can carry out all the operations of the tube with reasonable speed. The action of closing the side door is accomplished by means of a hydraulic cylinder acting on a wire rope, the end of which is attached, after passing over the necessary pulleys, to each end of the door. The clamps which hold the door tightly closed consist of channel bars, which are pushed down so as to secure the flange of the door to a flange on the tube itself. Several small hydraulic cylinders operate these clamps, and intercepting valves are provided so that the clamps cannot be forced down until the side door is properly closed, and also so as to prevent the clamps being raised unless the sluice-valve is shut. The tube is illustrated on page 314.

The large number of torpedo-tubes which has been recently

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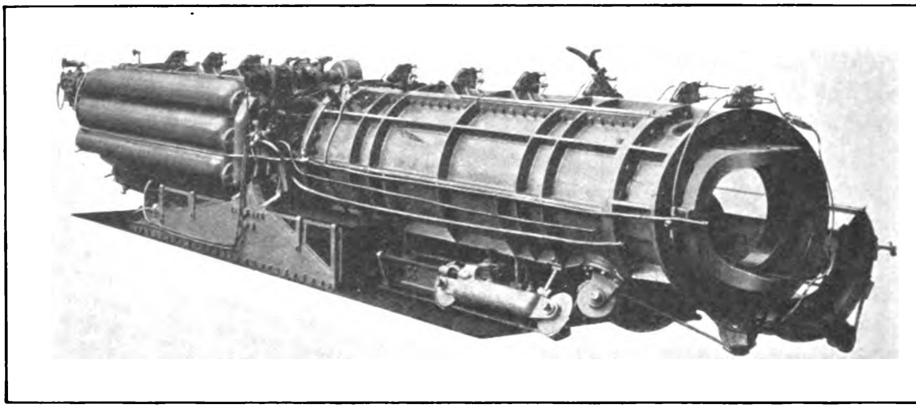
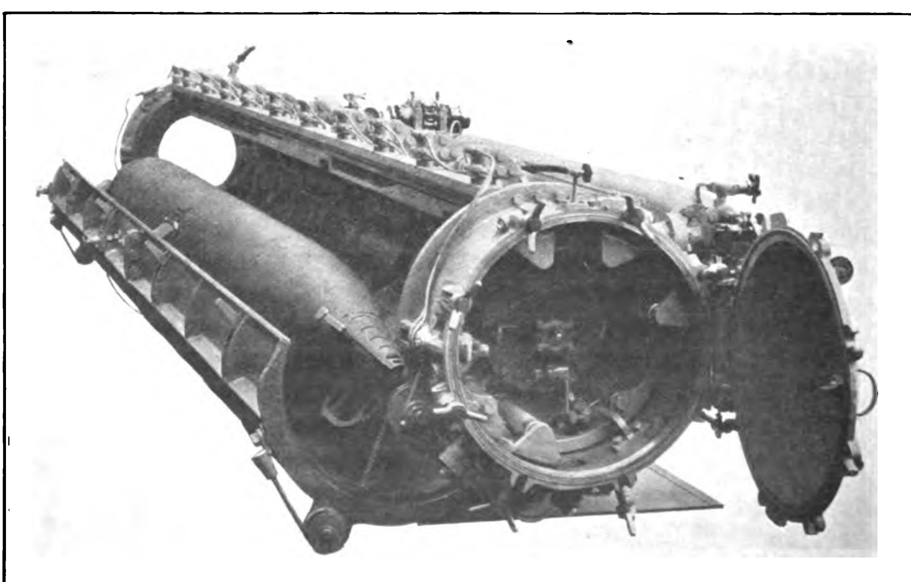


The side door shut.



The side door open.

ELSWICK 21-IN. SIDE-LOADING SUBMERGED TORPEDO-TUBE, HYDRAULICALLY OPERATED.

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mounted in the Japanese battle-cruisers, namely, eight in the Kongo and a similar number in the Hiyei, has necessitated some of the torpedo-rooms being placed on a higher level than others, and in consequence some of the torpedo-tubes have been placed at a distance of only 6 ft. below the water-line. Under these circumstances the pressure of the head of water was found not to be sufficient to return the tubes automatically, and therefore the new hydraulic gear for running the tube in and out has been adapted so that it will always return the inner tube automatically as soon as the torpedo has been discharged.

Sub-merged tubes.

Its action is as follows:—

A hydraulic cylinder carries a rack which rotates a pinion wheel which is geared by means of a sprocket wheel to a chain which drives a shaft on the top of the tube. This shaft is fitted with a pinion which gears on to a rack on the top of the inner tube itself, so that as it is rotated the tube is either driven in or out as desired. This shaft is further connected to the chain drive by means of two clutches, one acting in each direction, and a spring is provided which normally keeps engaged that clutch which is necessary for running in the tube.

The mechanism for ensuring the automatic return is worked on the following principle:—

When, in charging, the air pressure in the impulse reservoir of the tube reaches approximately 30 lb. per square inch, it puts a piston in a cylinder in motion. This motion opens a valve admitting hydraulic pressure to the run-in-and-out cylinder, and at the same time disengages the clutch so that the piston of the hydraulic press may travel outwards unloaded and assume a position in readiness for running the tube in again. After firing the tube, the pressure in the air reservoir will fall, and when it becomes less than 25 lb. per square inch the piston first mentioned will be forced into its cylinder by means of a spring. This will cause the run-in clutch to be re-engaged and the hydraulic pressure to be admitted to the cylinder for running in. The tube will accordingly run in automatically and without attention.

Two hand levers are provided, which are normally connected together by a pin. When this is removed both the clutch and the piston can be operated as desired, and the tube run in or out, provided the firing reservoir is uncharged. These levers also enable the position of the rack to be corrected should the tube come in faster than the run-in gear is operating and consequently overrun it.

The recent trials of the Kongo, in which eight Elswick submerged side loading 21-in. tubes were installed, were carried out most successfully, the highest speed attained by the ship during the trials being 25¾ knots. Eight similar tubes, but operated hydraulically instead of electrically, are installed in the sister-ship which is being built in Japan, the Hiyei, and a large number of similar tubes are being constructed for the Turkish, Brazilian and Chilean ships which are now being constructed in England.

The torpedo-tubes recently supplied have been guaranteed to discharge torpedoes safely with a ship's speed of 28 knots, and in order to ensure sufficient strength of the projecting spoon elaborate weight tests are carried out, as shown in the diagram on page 316, from which it will be seen that for a 6·8-metre torpedo a weight of 13·6 tons is suspended from the torpedo at a point of 64 in. outside

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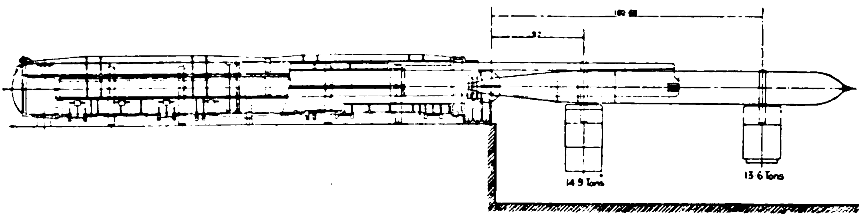
the end of the spoon, and a weight of 14·9 tons is suspended from the centre of the spoon itself. This test is carried out to ensure that the spoon shall take no permanent set, and in practice lines are scribed on it to show that it returns to its original position.

Torpedo handling gear.

The general adoption of the 21-in. torpedo, varying in length up to 6·8 metres, and in weight up to 28 cwt., necessitates improved means of handling these weapons in the torpedo-room. The old system of using slow and inefficient pulley-blocks for hoisting by hand has been replaced by hydraulic cylinders, which are capable of hoisting or lowering the torpedoes rapidly or slowly as required, with the speed of working always under thorough control. The cylinders are placed either vertically against a bulkhead or horizontally bolted to the underside of the deck above the torpedo-tubes. Guide pulleys are fixed where required, and the wire ropes used can be arranged so that one cylinder can hoist or lower at several different



ELSWICK TORPEDO-TUBE.
Arrangement showing method of testing spoon for a 6·8-metre torpedo with a speed of vessel of 28 knots.

points in the torpedo-room according to requirements. The cylinder can also be used for launching the torpedo into the tube when used in conjunction with end-loading tubes. For moving the torpedo from one part of the room to another, rails of channel or T-section are fitted, and have secured to their undersides malleable iron castings fitted with recesses suitably pitched, into which an ordinary toothed pinion can engage. A runner, mounted on roller or ball-bearing wheels, is arranged to travel on the T rail, and can be traversed in either direction by rotating the above-mentioned pinion by means of a chain wheel. This runner is fitted with a short chain and hook to which the sling carrying the torpedo can be attached. The T rail can be curved when the radius of the curvature is 6 ft. or more, but for sharp corners turntables operated by chain-worked turning gears are fitted.

The *modus operandi* of transferring a torpedo from a stowage rack to the tube is therefore as follows:—

Open the securing arms of the rack and fix sling to torpedo. Raise torpedo by means of the hydraulic hoist wire rope and transfer the load to the hook underneath

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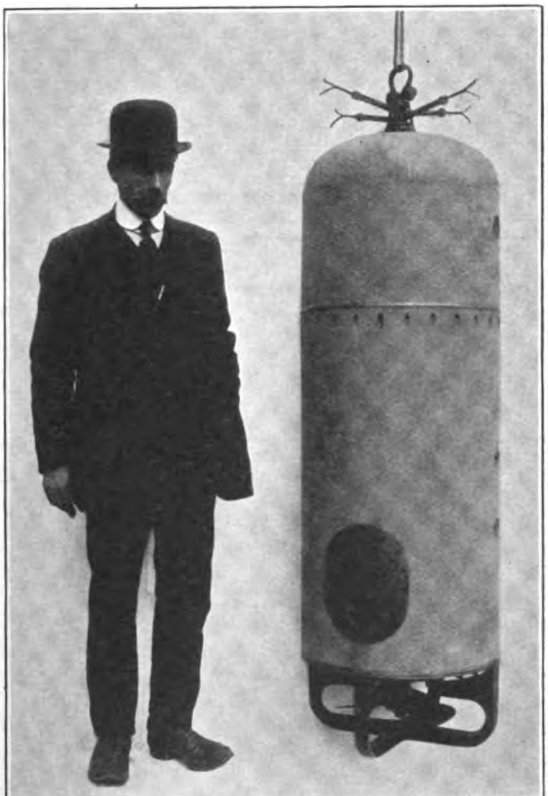
the runner. Traverse the runner to the desired position by the chain-operated travelling gear described. Connect wire rope to torpedo sling and take the load from the runner chain. Disconnect this chain and lower the torpedo on to the door of a side-loading tube or on to the trestles at the rear of an end-loading tube. If desired, arrangements can be readily made for lowering the torpedo on to trestles placed in any convenient position in the torpedo-room for overhauling or adjusting purposes. In order to make the runner quite safe when the vessel is rolling in a sea-way, a self-acting brake is fitted to prevent the load getting out of control.

The hydraulic pressure used is generally 1000 lb. per square inch, and is obtained either from the hydraulic service mains of the ship,



The Leon Torpedo.
Manufactured by Messrs. Beardmore.

or from the electric-driven pump fitted in the torpedo-room for operating the tubes.

Having regard to the extraordinary development in the last few years of submarine attack by mines and torpedoes, Messrs. Beardmore have recently acquired the rights of manufacture of a remarkable oscillating mine, known as the Leon torpedo. In form this mine resembles a short Whitehead torpedo, and is designed to be, if desired, discharged overboard through a torpedo-tube, though it can equally Floating mine.

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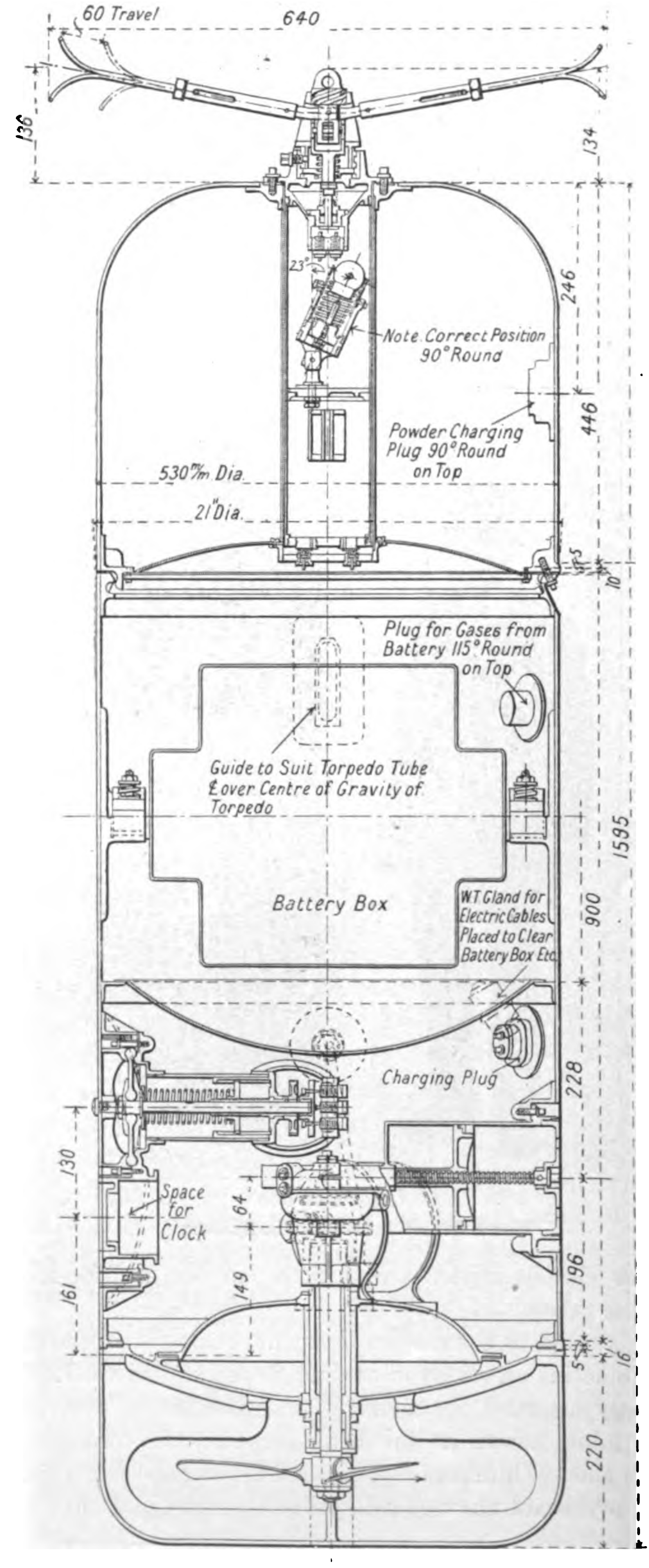

The Leon Torpedo.
Floating mine manufactured by Messrs. Beardmore.

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well be merely dropped overboard from above water. The size and general arrangement of the mine are shown on pages 317 and 318.

It is not an automobile torpedo, but merely a freely floating mine, which can be set to oscillate between any depths below the surface that may be desired; on becoming waterborne it assumes an approximately vertical position, and having a certain negative buoyancy it sinks until, automatically, the propeller is brought into use and drives it upwards again. As prearranged the action of the propeller ceases and commences at any depth selected for use. There is a time arrangement embodied by which the duration of its floating can be regulated; after such time the mine is flooded and sinks, or, if desired, can rise to the surface. It can also be so arranged that when first discharged it sinks to the bottom, and after a pre-arranged time rises and commences to oscillate.

The mine can be used in the open sea by any form of ship, and in the case of tidal harbours can be discharged from a vessel outside at such time as to find its own way into the harbour, and possibly create destruction therein.

These mines are being made at Messrs. Beardmore's Naval Construction Works, Dalmuir, of 21-in. and 18-in. diameters to suit existing torpedo-tubes, but can be of any size, and can be made to contain any quantity of explosive desired.

Submarine mines.

Messrs. Vickers, Ltd., during the last twelve months, have been making further experiments with automatic submarine mines, with a view to increasing the simplicity of the firing and mooring mechanisms, and of obtaining greater safety before launching, combined with certainty of action and precision in laying.

After exhaustive trials, extending over three months, a firing gear was devised in which the striker spring is normally unloaded, while the striker is attached by two hinged claws to a rod, which extends through the mine shell, and is loosely bolted to a safety sleeve which carries a firing lever or paddle. The head of the rod is securely locked to the mine shell by an intermediate right and left hand screw, so that no movement of the rod and striker is possible until the lever has moved through 1½ revolutions, relative to the mine, which is shown in the accompanying illustration on page 320.

The mine is spherical in form, and when struck by a ship it receives a rotary motion. The outer end of the firing lever is fitted with a small buoy, which holds it stationary in the water as the mine rotates, so that a twisting movement takes place between the firing lever and the body of the mine, which unscrews the rod from the shell. The buoyancy of the mine then causes it to slide up the rod and compresses the striker spring, until the striker is fully cocked,

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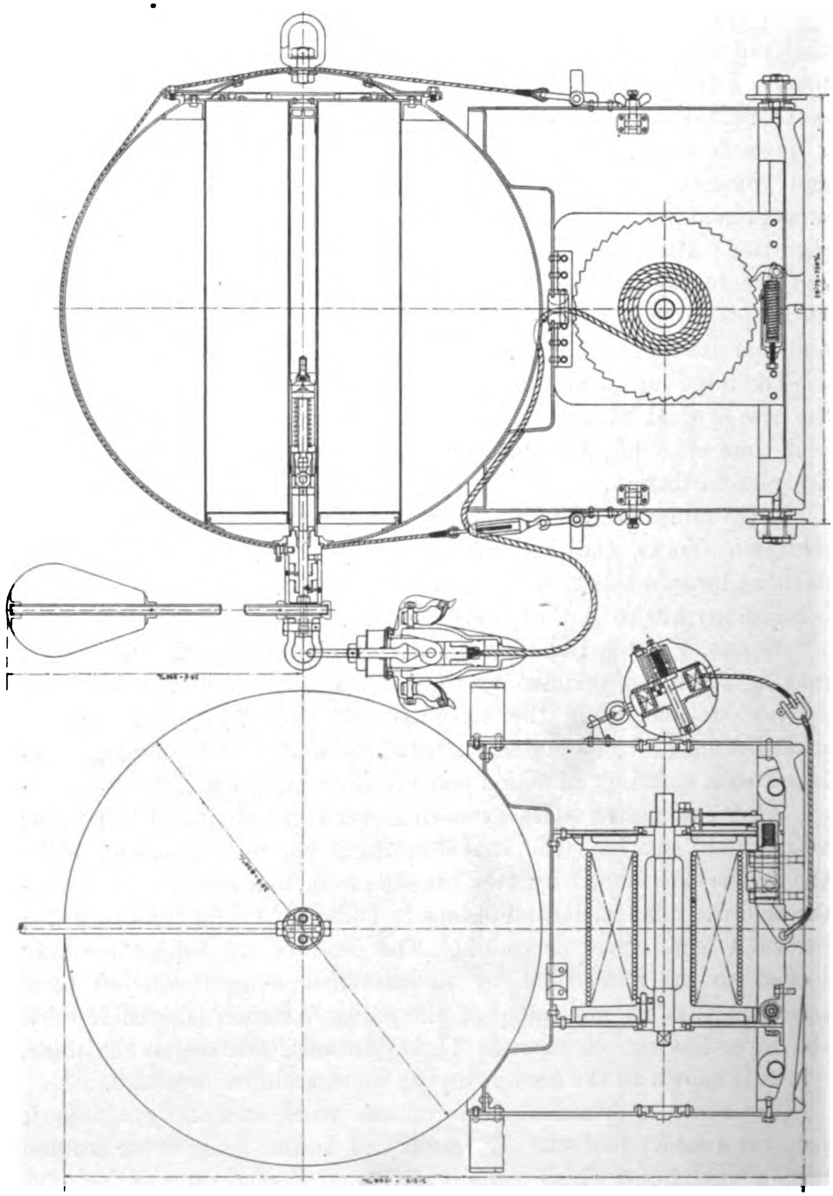
when the hinged claws on the rod open outwards into an enlarged diameter in the guide and release the striker, which is thrown on to the detonator by its spring.



VICKERS' AUTOMATIC SUBMARINE MINE.
General Arrangement.

The anchor is fitted with a winch containing the wire mooring-rope which is secured to the mine. A spring loaded plunger, adapted to engage, with slots cut in the flange of the winch, is mounted in

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the bottom of the anchor, and is connected by a bent lever and an adjustable length of cable to a heavy sounding ball, carried on the side of the anchor. A retaining cable, secured to the sides of the anchor, passes over the mine and holds it in position before launching, and suitable wheels are fitted to the lower part of the anchor to enable the equipment to be easily transported over the launching-rails which curve downwards over the stern of the ship.

When launched the mine remains on the surface, whilst the anchor sinks with the sounding ball hanging below at the end of its cable. The weight prevents the plunger locking the cable winch until the ball reaches the bottom, when the load is taken off the plunger, which then engages with the winch and prevents it paying out further cable. The continued descent of the anchor drags the mine beneath the surface, so the immersion of the mine is equal to the distance between the sounding ball and the anchor.

A device is introduced between the mine and its mooring cable to enable the equipment to be easily recovered. The cable is secured to a crosshead in which are mounted two hinged claws, held by the walls of the body, in engagement with the head of a bolt secured to the mine. Part of the sweeping cable towed by the recovering boats comes into contact with the mooring cable of the mine, and slides up it until it engages with the body, which it raises. The claws are then free to open outwards and release the bolt, so that the mine rises to the surface, where it may be secured, while the sweeping cable remains engaged with the body attached to the mooring cable and provides a means of recovering the anchor.

So far as is generally known, no great advance has been made recently in the quality of armour, and increased protective effect has only been attempted by greater thickness. New processes of armour production are known to be in course of development, but there has been nothing like the improvement noted by Mr. Beardmore when he said that the 8-in. armour of 1906 was more than equal to the 12-in. armour of 1902. The rate at which our big ships can now be constructed depends mainly on the time required for making the armour in the quantity and of the thickness demanded. Larger quantities are needed for the later ships. In some new vessels as much as 6000 tons weight is employed. Greater care, and therefore longer time, is necessitated by the new processes of construction. Armour for about ten of the biggest ships can be turned out in this country annually. Although there are exceptions, the general tendency is to extend the armoured protection towards the ends of the ship, and particularly towards the bows, as well as to provide **Armour.**

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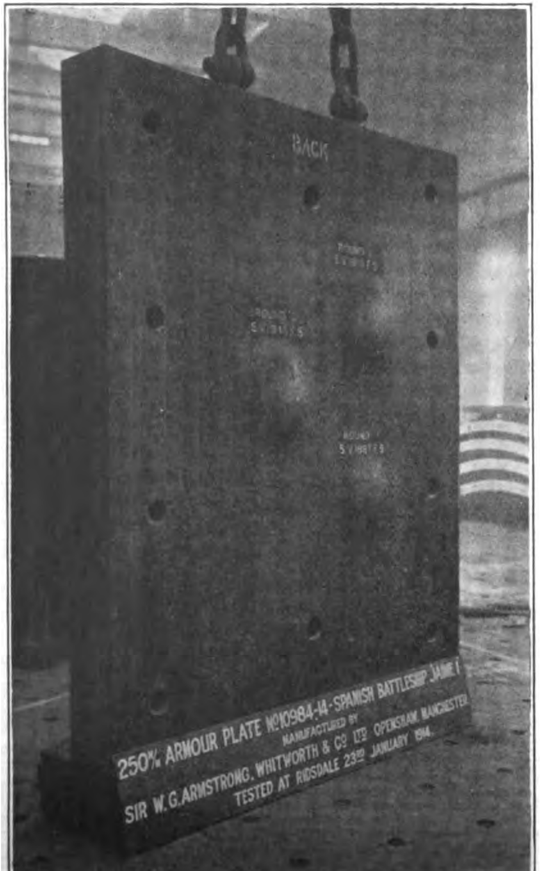
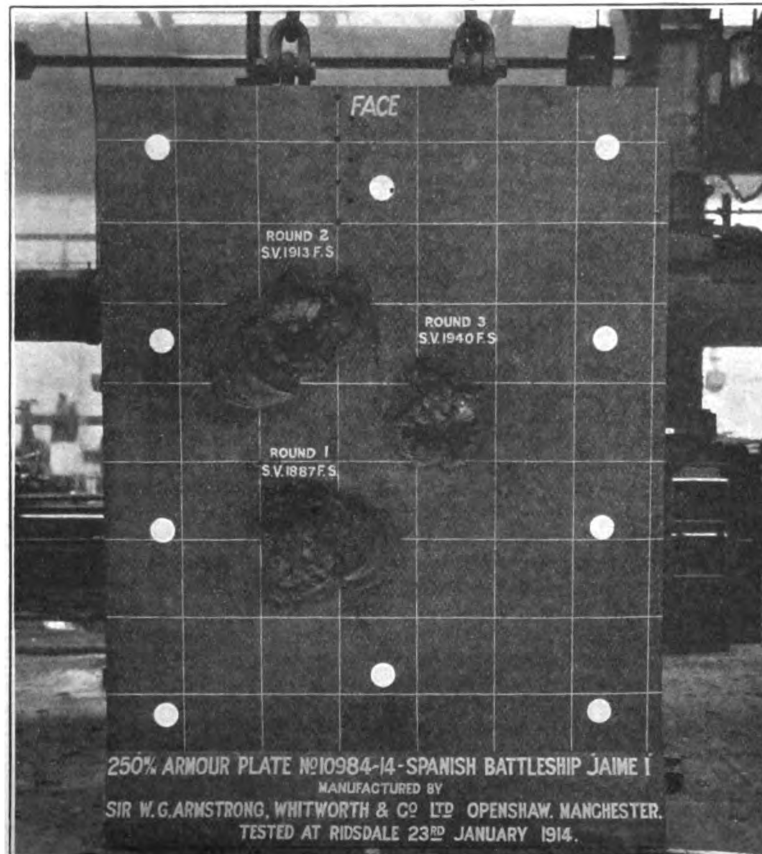


Back of Plate.



Front of Plate.

Armour-Plates of the Spanish Battleship Jaime I.

Constructed by Sir W. G. Armstrong, Whitworth & Co., Ltd. Tested at Ridsdale January, 1914.

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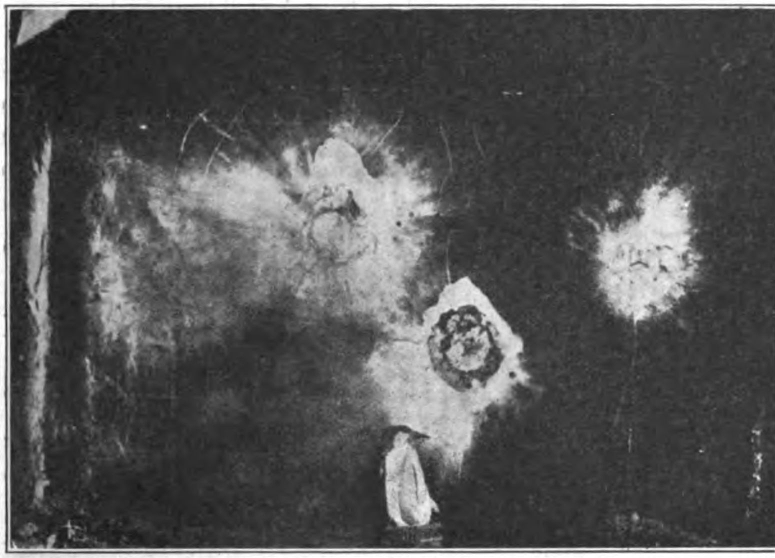
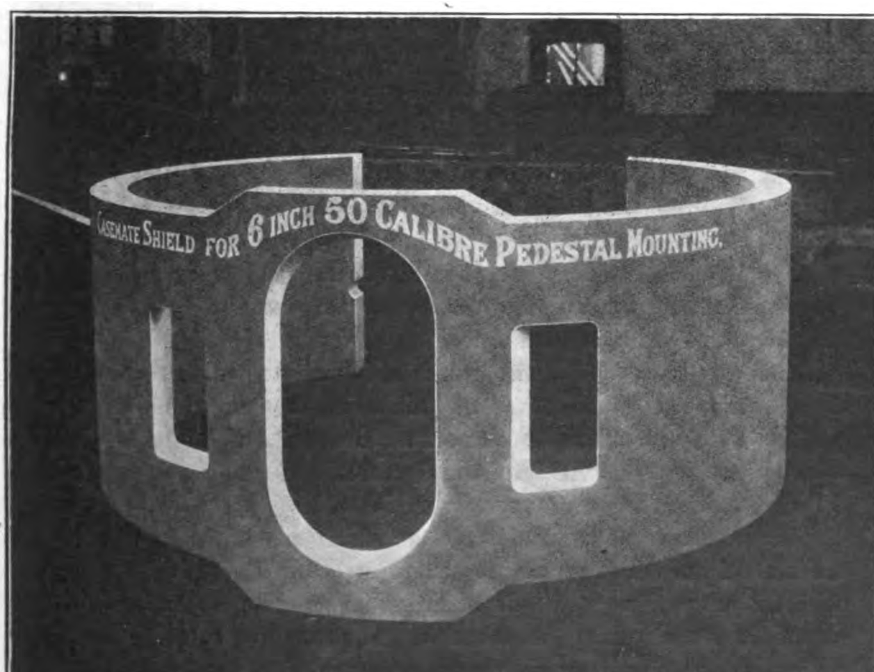


GUN ARMOUR-PLATE FORE CASEMATE OF BATTLESHIP.
After attack with a 12-in. gun.



CASEMATE SHIELD OF PEDESTAL MOUNTING FOR THE 6-IN. 50-CAL. GUN.
Constructed at the works of Messrs. Cammell Laird & Co.

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protective decks and bulkheads as a provision against the effect of under-water explosion.

The photographs reproduced on page 322 show the results of the tests of one of the armour-plates constructed by Sir W. G. Armstrong, Whitworth & Co., at their Openshaw Works, for a barbette on the Spanish battleship Jaime I., which is now being completed at Ferrol, by the Sociedad Española de Construccion Naval. These trials took place in January, and the following description is taken from *Engineering*:—

The plate is of the K.C. type, was manufactured at the Openshaw works of the firm, and measures 7 ft. 2¼ in. by 8 ft. 8¼ in., the weight being 11 tons 3 cwt. 3 qr.

The tests took place at the Ridsdale range, the projectiles used being of the Holtzer and Firth makes, weighing 380 lb., and drawn from supplies manufactured under the supervision of the British Admiralty. The gun used was of 9·2-in. calibre. The plate was mounted on 2 ft. of oak backing secured to the skin-plating, corresponding to that on the ship, by ten bolts passing through the skin-plate and the oak backing into the holes shown on Fig. 2.

The first shot fired was a Holtzer projectile, which had a striking velocity of 1887 f.s., equivalent to a striking energy of 9381 f.t. The second was a Firth projectile, with a slightly increased velocity—namely, 1913 f.s., the corresponding energy being 9640 f.t.; and the third was a Holtzer projectile, the velocity being still further increased to 1940 f.s., equal to a striking energy of 9914 f.t. The maximum measurable penetration was found to have been 3¾ in. The flaking seen on the first shot was largely the result of the impact of the second shot, while the third shot also extended the flaking where the second projectile had struck the plate. The flaking averaged only about ½ in. in depth in the case of the first and second shots, the maximum depth being about 1 in. in both cases—this was close to the point where the projectile had originally struck the plate. This tapered away to something like ⅛ in., and, as we have said, the average depth was about ½ in. The bulge of the back of the plate is well shown in Fig. 2. In the case of the first round, the height of bulge was about 1½ in.; of the second, 1 7/16 in.; and of the third, 2 in.; but in no case was there any evidence of cracking. The results are certainly very satisfactory, the total energy of the attack, 28,935 f.t., corresponding to 2594 f.t. per ton of plate.

The photograph reproduced on page 323 shows a Cammell Laird 9-in. plate, intended for the casemate of a battleship, after test with a 12-in. gun. We are not at liberty to publish particulars of the design of the casemate, nor the firing trials, but it will be seen from the photograph that the plate withstood in an excellent manner the impact of the 12-in. projectile.

Curved casemate shield.

The forged casemate shield for a 6-in. 50-calibre pedestal mounting, from the works of Messrs. Cammell Laird & Co., reproduced on page 323, illustrates a type of armour structure of a different character, which this firm is required to manufacture.

Under-water protection.

The two methods of protecting the sides of the ship against torpedo attack or submarine explosion which are shown on page 325 are taken from Mr. Owens's paper on Battleship Design. In Fig. 1, which represents no great departure from present methods of construction, full advantage is taken of the protective value of coal in conjunction with an air compartment permitting expansion of the explosive gases, and an inner protective bulkhead about 1½ in. thick. Proposals have been made to fit underwater broadside

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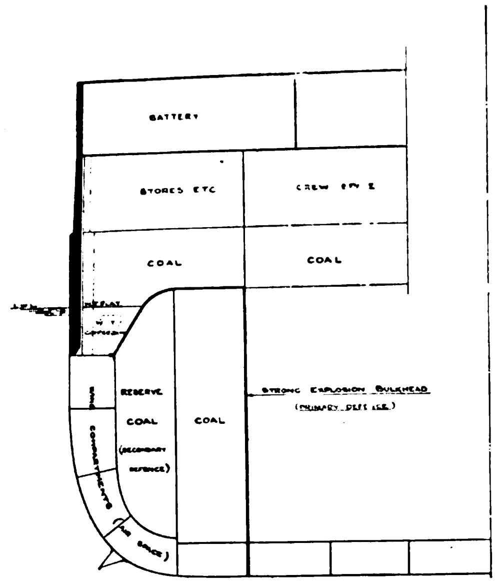
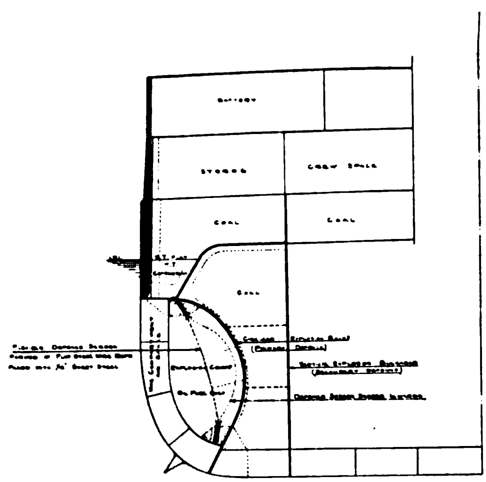
protection in such a way as to provide a more or less elastic shield which would, to some extent, minimise by its flexibility the effect of the full force of the explosion. This method is shown in Fig. 2.

The question of internal subdivision is also dealt with by



MIDSHIP SECTION OF BATTLESHIP. FIG. I.

Showing ordinary bulkhead subdivision combining coal protection, with an inner strong explosion bulkhead forming an underwater protection against torpedoes.



MIDSHIP SECTION OF BATTLESHIP. FIG. II.

Showing circular explosion bulkhead and intermediate flexible defence screen for protection against explosion of torpedoes.

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Mr. Owens, who states that the more the internal space both above and below the water-line is subdivided into water-tight compartments the less likelihood is there of the vessel being put out of action either by shell fire or submarine explosions. It should also be borne in mind that the same aggregate amount of damage would occur to a small as to a large ship from torpedo attack, and it will readily be seen that an explosion which might possibly put the small ship out of action might leave the large ship quite capable of manœuvring and continuing in action. As an example of what it is possible to do in the way of meeting such under-water attacks, reference may be made to a foreign warship built by Vickers, under a contract stipulation that in the event of 50 ft. of the side being blown away amidship the vessel should not heel over to more than 11 degrees, and automatically regain the vertical in a certain specified time, although necessarily with an increased draught due to the buoyancy lost.

The longitudinal protective bulkheads below the water-line protective deck should, if experiments count for anything, be at least 15 ft. from the ship's side and extend as far as practicable throughout the length of the ship. The construction should be such that that part of the protective deck between the top of such bulkheads and the outer plating would be subject to fracture before the longitudinal protective bulkheads were stressed up to their limits by the confined gases in the outer wing compartments due to any submarine explosion, but it is difficult to arrange for this in a reliable manner. The distance that the bulkhead is from the side of the ship appears to be of more importance than its actual thickness. One experiment carried out showed that a thick bulkhead fitted at the usual distance from the sides was broken up by the force of a submarine explosion and the pieces hurled through the inner bulkheads, destroying the boilers in its course. More damage apparently resulted than if such bulkhead had not existed.

Projectiles.

During the past year the old question of the attack of hard-faced armour at an angle has received an accession of interest in many quarters. In France it has long been the custom to fire the acceptance tests of their armour piercing shell at an angle of 15 deg. to the normal, and such a course appears logical in view of the great predominance of oblique impacts in action. We understand that a somewhat similar course is being adopted in the Navy of another of the Great Powers, where a number of angle trials have been carried out. It is satisfactory to note that a British firm was represented in these trials, and that very successful results have been obtained with Messrs. Hadfield's shell. We are able to give the actual results

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obtained together with a photograph of the two shells, both of which remained unbroken after this very severe test.

Angle Attack Trials.

Hadfield's 14-in. A.P. shot (weight 1400 lbs.) with patent cap.

Round	Velocity (f.s.)	Result.
1	1870	Recovered unbroken.
2	1866	Recovered unbroken.

HADFIELD'S 14-IN. A.P. SHELL.

The two shells shown penetrated 13½-in. K.C. armour-plate, and were recovered in effective bursting condition.

AVIATION.

The Admiralty are pursuing a very active policy in connection with the provision of an Air Fleet, in which Mr. Winston Churchill, the First Lord of the Admiralty, has taken a specially keen interest; and although it is not permissible to write fully as to the extent of

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the work being done in this matter, it may be well to indicate some of the features, not only of the airship which is being most largely adopted for the British Fleet, but also some of the arrangements made for the construction of these vessels. As is well-known, the Admiralty Air Department was established some time ago, with Capt. Murray Sueter as the responsible Director, and the result has been a very careful enquiry, not only into the *desiderata* to be met in the design of such vessels, but also into the features of the design embodied in existing airships. The Admiralty Air Department, too, have made many experiments with airships, and in this they have had the co-operation of Messrs. Vickers, Ltd., who have made many tests in connection with the details of design and the parts, as well as the machinery of airships. It is gratifying also to know that the other great naval construction firm, Sir W. G. Armstrong, Whitworth & Co., Ltd., are taking up the building of such craft.

Airship manufacture. Orders have been placed for building airships, and elaborate provision has already been made at Messrs. Vickers's works for pushing forward the construction of these vessels. Before arriving at the design, trials were carried out by the Admiralty Air Department, and the speeds realised with the prototype of the class was 47 miles per hour. One of the most important characteristics of the vessels now being built will be their unexampled portability. The ship can be dissembled and packed in lorries for use in transport, or can be carried on board a ship, and thus may be moved from one to another of the many airship bases which are being organised round the coasts, and at which large hangars are being constructed consistent with the statesmanship policy of Mr. Churchill, who, perhaps more than any other, has recognised fully the value of this new munition of war. Two balloonets are to be fitted in order to enable the ship to be trimmed by the simple process of pumping air from one to the other. Another special feature is the system of automatically working the valves. The car to be adopted will be of the swinging type, so that pitching due to the operation of the propeller thrust will be automatically checked by the position of the centre of gravity. All these features have been proved satisfactory as the result of the tests made with the ship, which has flown over 2000 miles under the command of the Admiralty officers.

Airship shed, Walney. The new airship shed now under construction on Walney Island, Barrow-in-Furness, is being erected to house the latest models of Parseval and Zeppelin airships. For the present the ships will be delivered to the site ready for final erecting, the actual work of manufacturing the parts of the structure being carried out elsewhere.

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The shed is a structure of modern design with sloping sides and arched roof, and guaranteed to withstand the fiercest gales that are likely to be experienced on the west coast of England from time to time. In many ways the site chosen for the erection of this shed is most suitable, not the least being that, given ordinary fine weather, a ship can be taken out and trials conducted over surroundings which are quite free from obstructions of any kind, for several miles radius.

The internal dimensions of the sheds are—

Length	540 feet.
Breadth	150 „
Height	98 „

The breadth enables two very large ships to be built side by side.

The foundations of the shed consist of solid reinforced concrete blocks of special design with foundation bolts set in. Inside the area of the shed is laid a 6-in. concrete floor, ensuring a dry and level floor. The main columns, of which there are thirty-four on each side, consist of two uprights of pine timber in one length, suitably braced with timber and bound with steel rods, each upright forming a rigid column.

In view of the great width of the shed, the roof principals are of very special construction, consisting of strong wood compression members arched to the shape of the roof, supported below by mild steel tie plates and tension rods. The lifting weight of one of these girders is about 8 tons, and in order to place these in position on the uprights after being assembled on the ground it was found necessary to erect a huge travelling gantry, on rails, to be used for lifting the principals, the lifting tackle being attached at seven points in the girder. The lifting is done by hand winches worked from the base of the gantry. A platform at the top of this scaffold enables the men to carry out the work of fitting the purlins, rafters, etc., into position, in comparative comfort, with a rigid platform some 20 ft. below. Roof.

The walls and roof coverings consist of pine boarding, tongued and grooved, the walls being creosoted outside and inside, the roof covered with a layer of approved waterproof felt. Efficient lighting and ventilation is embodied in the design. In order that the work may be carried on efficiently when hydrogen gas is being used, all secondary arc lights will be enclosed in air-tight lamp boxes built into the sides of the shed ensuring complete safety against explosion or fire. At each end of the roof are fitted towers, from which the

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work of taking out a ship when completed can be directed. These towers are in communication with one another by a gangway running the whole length of the shed under the ridge of the roof, from which a staircase leads down to the ground. A runway extends the full length of the building, capable of lifting 2 tons, situated below the gangway.

Doors. A special feature of this shed is the fitting of double-hinged doors at both ends, instead of curtains as usually fitted. These doors are of special construction, consisting of a strong metal framework, suitably stayed and covered with pine boarding, tongued and grooved. The doors are designed to withstand the full wind-pressures when closed. In view of the weight of each door and their peculiar construction, they are mounted on two roller paths, and are opened and shut by means of hand-operated gears acting on the wheels of the outer path, the inner wheels acting as guides. The disposition of the wheels, four in number, supporting each door, form a movable base, at the same time supplying the required stability necessary when opening and closing the doors. When full open the doors form an angle of 108 degrees with the end of the shed, leaving a clear space for taking out a ship in fine weather.

For the safe handling of a ship when being warped in and out of the shed, three lengths of rails are fitted, extending the full length of the shed inside and about 450 ft. outside at both ends. By this means the ship is to be "tied" to trolleys on the underside of the rails and run out at the double by Bluejackets or Marines. The system of fitting three sets of rails, spaced wide apart and the extra width of the shed, enables the ship to be placed diagonally, if required, to suit the direction of wind and taken out head to wind. The hinged doors, too, when open afford additional protection from the wind. As the winds round Walney Island are least during the early mornings, and assistance may be required to take a ship out at short notice, accommodation for 200 men is arranged for in wood buildings beside the main shed.

In order to facilitate the handling of the ships when in the open air, mooring masts are provided as required clear of the flying area, and strong ringbolts, mounted in concrete blocks in the ground, are fitted throughout the aerodrome.

A complete system of fire extinguishing is embodied in the equipment of the shed, and enables eight jets to be brought to bear on the building, the water being pumped from a reservoir on the site.

Balloon factory. The airship envelope and gas-bag factory consists of a large, well-lighted building, 350 ft. by 100 ft. by 60 ft. There are also several small buildings adjoining, where the processes preparatory to making

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up are carried out, and a store where a large stock of balloon fabric and the various solutions necessary for the work are kept.

The factory, when in full working order, will employ about 100 hands, and will be capable of constructing one non-rigid airship envelope per month, as well as the gas-bags for rigid airships on order. Special long cutting-out tables have been installed, as well as sewing and cutting machines of a special type adapted for balloon work. The cutting machine is capable of cutting from ten to twenty layers of material at one time. The work is of such a delicate nature that hand labour must be used to a large extent. All the joints made in the material have to be made as strong as the material itself, and must also be impermeable. The methods adopted have been selected from a close study of English and Continental methods, and are considered superior to any in use on the Continent.

A wide selection of materials are used, varying according to the type and size of airships under construction. For instance, for the envelope of non-rigid airships, very strong, comparatively heavy materials have to be used to withstand the stresses on them, whilst for the balloonets of these and the gas-bags for the rigid airships much lighter fabrics may be used. Special materials and methods are used to make the fabrics almost impermeable to hydrogen. The materials for outer covers of rigid airships is again different. This is only a surfacing material, and need not be hydrogen-tight, but only waterproof and weather-resisting. It can, therefore, be as light as possible, consistent with it having strength enough to be drawn taut to prevent flapping, and to be handled without tearing.

It is necessary for good balloon work that all materials be accurately tested. A strength-testing machine, designed and constructed by Messrs. W. & T. Avery, similar to that used at the National Physical Laboratory, has been installed for this purpose. The special feature of this machine is that it applies a load at a steady constant rate, so that errors due to varying rates of testing are eliminated. An apparatus has also been designed for accurately testing the permeability of hydrogen through the fabrics, and a sample cut from each length of fabric is tested for permeability.

Cavendish Dock shed.

The original Vickers airship shed is situated on the side of Cavendish Dock, Barrow, and is built over the water with one side resting on the dock-side, and is 534 ft. long. The following are the principal dimensions and characteristics of this building:—

The main columns and roof trusses are spaced 50 ft. centres and are connected by continuous lattice girders at centre line and at 25 ft. from centre line, these lattice girders carrying a runway on their lower flanges suitable for loads up to 2 tons. The main columns on the water-side are connected by and rest on double lattice girders carried on pile clusters. There are two intermediate columns and trusses between each main column. All columns are of lattice box type, the main

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one being 3 ft. wide and the intermediate 12 in. wide, of angles diagonally braced on all sides. The land columns rest on concrete foundations and are also piled. One end is closed in by a V-shaped end of similar construction to the main building. The other end is closed by means of a canvas curtain above the ground level and by a steel gate covered with boarding from ground to water level. The canvas curtain is built up on vertical wire ropes with rollers top and bottom and is suspended from a suitable girder at the top acting as a runner and the bottom rollers act as a guide. The vertical wire ropes are stayed by means of wire rope guys led to pile clusters at the side of the shed so as to have the opening clear. The curtain is opened and closed by means of a winch with three draw-ropes, and can be opened or closed in fifteen minutes. The clear opening through the curtain when furled is 70 ft. wide by the full height of the shed. The opening through the gate is 44 ft.

The sides and closed end of the shed are covered with No. 220 corrugated iron with a window 20 ft. by 13 ft. 6 in. between each main column, alternately 15 ft. and 33 ft. above ground to bottom, of glass. The roof is boarded and covered with fibre cement slates. There are eighteen Boyle's ventilators. For a length of 350 ft. the shed is now boarded over at the ground-level, and in the remaining part there is a platform 28 ft. wide on the land side. For drawing the ship from the shed a bollard has been fixed some distance from the end of the shed on a pile cluster and fairleads fitted on the dock-side.

As already stated, the Armstrong firm has also, in view of the importance which the science of aviation has taken in naval and military matters, decided to take up this branch on the extensive scale usual in the operations of that company.

For this purpose land to the extent of nearly 1000 acres has been purchased in the Selby district of Yorkshire, with a view to the laying down of large dirigible manufacturing works and the building of an aeroplane factory on the most modern principles. In the meantime, large temporary premises have been rented in Newcastle for the construction of aeroplanes, and the company is now in a position to undertake the manufacture of all types of air-craft, including dirigibles, aeroplanes, seaplanes, etc., and is also manufacturing high-powered aviation engines.

As stated by Mr. Churchill when introducing the Naval Estimates, this company has already received orders for the construction of three airships. The works in Yorkshire are being advanced as rapidly as possible. The buildings to be erected will include a hangar on the most improved principles.

Seaplanes. In regard to seaplanes, as the heavier-than-air flying machines to be employed in connection with the Navy are now called, the great advance that has been made, and the promise which experience gained with the older craft gives of large effective use, has been noted. Details of the construction of these machines and their engines, and the measures taken for their supply, do not fall within the scope of this section, but a description of the Vickers aeroplane factory at Crayford seems to be desirable as showing the extent to which the armament firms are entering into this matter, and also as an example of a well-thought out and very thoroughly equipped manufactory of the kind. In addition to the Vickers firm, both the Elswick and Coventry companies are building seaplanes, and almost all the

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establishments which undertake the provision of war material are engaging in the construction of engines and other parts of the equipment of these air-craft.

Aeroplane building at Crayford.

Crayford is within a mile and a-half, as the aeroplane flies, of Joyce Green, Vickers's private flying ground. The flying ground is due west of the factory, and in this direction the firm own a grass field of approximately twenty acres. At the east end of this grass field is the new aeroplane erecting shop, so that the machines, immediately after completion, can be taken out from the shop and flown straight to the aerodrome. The erecting shop consists of three bays, the centre bay being 60 ft. wide, and each of the others 30 ft. The length of the whole building is 280 ft., and the complete end of the centre bay is closed with sliding doors which open outwards. The two side bays have a special roof construction, which permits of the fixing of shafting at any point without special rigging. The centre bay is fitted with two travelling cranes of 3-ton capacity. The whole building is of most modern construction, with roof lighting; the roof itself is of Eternite tiles underlined with wood. The floor is reinforced concrete supported on concrete piers taken down through a somewhat soft soil to an underlying shingle bed. These piers are placed at 15 ft. centre to centre, and crossed in each direction by heavy rails; on these rails is a 5-in. reinforced concrete floor, which in turn carries wood-block flooring.

The whole building is heated and ventilated with properly humidified and heated air, so that the atmosphere in the shop during both summer and winter can be kept constant as regards heat and humidity.

The general arrangement of manufacture is for the finished parts to be sent into the shop from other departments of the factory where they have been made. The primary assembling takes place in the two side bays at one end of the shop. All the parts are assembled into groups, and the various groups are next assembled together, and these latter, as they progress, gradually move towards the main doors of the shop, combining with other groups until the completed aeroplane is arrived at. The production of the shop for its floor space is thus as high as possible, and complete order in manufacture and specialisation on the assembly of various parts by different gangs of men is arrived at. Each assembly group is inspected before being combined with other assemblies, and finally the whole machine is inspected in the finished state. Immediately adjoining the erecting shops are sheds for storage of timber and for doping the covering materials. The aviation drawing office forms an upper storey to the north end of the main building, and the draughtsmen and staff are thus in intimate touch with production.

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The actual parts for assembly are made in other parts of the factory, in which a most perfect equipment of machinery for producing aeroplane engines and aeroplanes both in steel and wood is installed. The machinery includes hydraulic and mechanical presses of great power, special machines for punching out sheet metal, as well as the ordinary type of press, every type of milling and drilling machine, and a very complete oxy-acetylene welding equipment, with many special jigs and fixtures for holding the work and accurately aligning it during the welding processes. Annealing and stoving ovens are employed. Woodworking is done in another department, which, again, is very fully equipped with the latest type of machines, and, where it has been found necessary, specially built tools. The factory is, of course, equipped with a very complete test shop, including every type of physical and chemical testing apparatus.

The aeroplane engine department is entirely separate from the actual aeroplane building, and is equipped with a magnificent battery of machines, mainly by Messrs. Alfred Herbert, Ltd., of Coventry. Practically the entire engine is made of steel, and many completely special machines have been installed for its manufacture. After assembling, the engines are tested on a special type of wheel-carriage, and delivered to the aeroplane assembling shop ready for installation on the machines.

It will be seen that the Crayford factory is entirely self-contained, being able to turn out an absolutely complete aeroplane, including the engine, the only things bought outside being the fabric for covering and the raw material.

Air-craft armament.

It is particularly with the armament of air-craft and the provision of guns on special mountings for their attack that we are concerned here, and although these matters must still be considered to be in a somewhat experimental stage, much progress has been made in this direction. With the mounting of two 3-in. anti-air-craft guns in each of the battleships of the Iron Duke class, what may be described as a temporary decision has already been arrived at, which there is reason to suppose may consolidate itself into a permanent one.

The Armstrong firm has given great attention to this matter, and although, for the reasons mentioned above, it is inexpedient to give full details, it may be said that this firm has produced mountings for guns for the special purpose of attacking air-craft and for use in air-craft, both dirigibles and seaplanes. They have also produced movable mountings which, although primarily intended for land service, would be useful adjuncts to the equipment of a naval force establishing a temporary base. These consist of specially designed

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field carriages for 18-pdr. guns, and a special motor car mounting for lighter guns up to 6-pdr. It is to be remembered that the principal part of an anti-air-craft armament lies in the details of the mounting and sighting, and it is on these points that the Armstrong firm has brought to bear its great experience, and with notable success.

For the naval mountings for ships' use and the stationary mounts for land work it may be stated that the gun which finds most favour is the 3-in. gun, with a comparatively low velocity of about 1700 f.s. The action of the gun is either semi-automatic or fully automatic. Its rapidity of fire is great, and no difficulty should be experienced in obtaining twenty-five rounds a minute. In some positions it may be necessary to provide a gun which will be equally effective either against air-craft or torpedo craft. For this purpose a more powerful gun is necessary, the calibre being of 3 in., but the velocity of about 2500 f.s. It does not appear that the employment of direct hitting projectiles which are to burst on impact would be of use against high-speed seaplanes, as the chances of a correct hit would be small. The general opinion seems to be that shrapnel shell, with a special time fuse, will give better results. As it may be desirable under certain circumstances to use high-explosive shell, arrangements are also made for the use of these projectiles; especially is this the case with the light guns under 6-pdr. With these guns, a better effect may be obtained from high-explosive shell than from a small shrapnel. The Armstrong mountings for use in dirigibles and aeroplanes are designed for guns of from rifle-calibre upwards to those firing a projectile of about 2 lb. weight. They are entirely automatic in their action. Training, elevating and sighting are arranged so that they can be operated with the least displacement of position of the gunner. In past issues of the *Naval Annual* some of the earlier forms of mountings got out by the Coventry, Vickers, and Armstrong firms have been described and illustrated.

Anti-air-craft ordnance.

Particular attention continues to be given to the subject of mounting guns capable of firing at high angles for anti-air-craft purposes by the firm of Vickers, Limited, and, as might be expected, recent development in this class of ordnance material has resulted in many ingenious contrivances. This company have made a speciality of the application of their fully automatic guns and are now producing these of various calibres, from rifle calibre up to 2-pdr., capable of a rate of fire of from 500 rounds per minute with the rifle calibre to 200 rounds per minute with the 2-pdr., and after prolonged and exhaustive trials with these guns, they have succeeded in perfecting their arrangement so that the guns fire with equal facility at from

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10 degrees depression to 80 degrees elevation, the fully-automatic functioning being absolutely certain during this great range of elevation, and moreover the positions and design of sights are so arranged as to be perfectly comfortable for the gun-layer at all angles of elevation.

The arrangement of the Vickers automatic gun on adjustable tripod mounting, used for high-angle elevation for anti-air-craft purposes, and the same gun on a naval pedestal mounting with the gun in the high-angle position, are shown in the accompanying illustrations. The 3-in. gun and the 2-pdr. gun are also shown on a pedestal mounting adapted for anti-torpedo or anti-air-craft attack.

The special feature of the pedestal mounting is, that not only can the gun be fired at practically all angles of elevation, but that the pivot round which the gun is traversed is always in the vertical position. The illustration on page 337 shows the Vickers automatic gun on this mounting arranged for high-angle firing. A particular advantage obtained by using the fully automatic gun as an anti-air-craft gun is that the great rate of fire ensures great facility in detecting the effectiveness of the fire. At stated intervals either fused projectiles or smoke-producing projectiles are inserted in the belt, and this makes it possible to detect with the utmost certainty the effectiveness or otherwise of the gun-laying, so that a practically constant stream of ammunition may be played on the air-craft which is being attacked.

For the larger calibres of ordnance for this service, the semi-automatic gun is eminently suitable, and the illustration on page 339 shows the general arrangement of mounting for the 3-in. 45-calibre gun with semi-automatic breech action, capable of firing up to 80 degrees elevation.

3-in. gun on high-angle mount.

The 3-in. 45-calibre Vickers semi-automatic gun on a high-angle pedestal mounting may be used either as an anti-torpedo gun or as anti-air-craft weapon. The breech action consists of a horizontal sliding-block, and is semi-automatic; that is, the breech is opened during the run out of the gun after firing, and the empty cartridge case ejected, and is automatically closed as the case is inserted. The weight of the projectile is 10·841 lb., and the muzzle velocity is 2700 f.s. The mounting is designed so that the gun can be fired at all angles from several degrees depression to 80 degrees elevation. The hand-wheels for elevating and training gears are conveniently situated, the former on the left-hand side of the mounting and the latter on the right-hand side of the mounting. The sight is cross connected, and the eyepieces of the telescope and the general construction of the sight are so arranged with respect to position and

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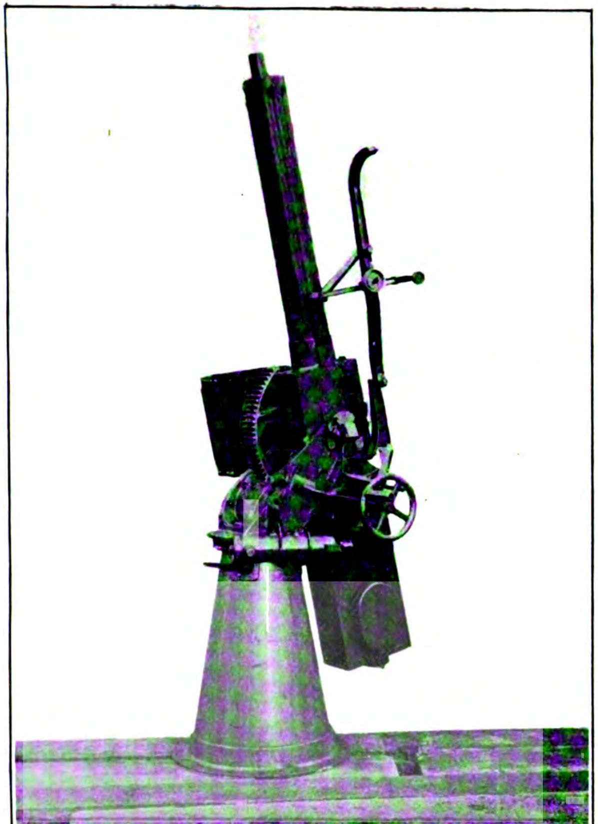
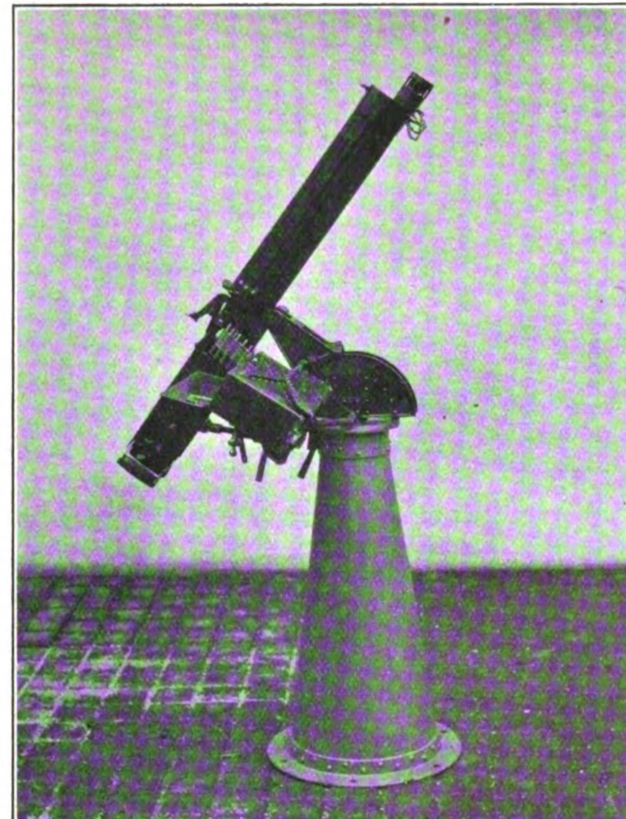


Vickers 2-pdr. (40 mm.) Automatic Gun.



Vickers Automatic Gun on Naval Mounting.

Vickers High-Angle Mountings for Anti-Air-craft Attack.

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detail that they are equally convenient for the gun-layers at all angles of elevations, and no trouble whatever is experienced in following the target with this arrangement. A rate of fire of about twenty-five rounds per minute is obtainable with this gun.

2-pdr. automatic gun on high-angle mount.

The latest type of Vickers automatic gun on a pedestal mounting, suitable for high-angle fire and for use against air-craft, is a 2-pdr. The gun is fully automatic, and shots can be fired singly or automatically as desired. The gun fires a projectile weighing 2 lb., with a muzzle velocity of 2000 f.s., and can fire them at the rate of 200 per minute. The mounting has been designed so that the gun can fire at all angles from 10 degrees depression up to 80 degrees elevation and all round traverse. The hand-wheels controlling the elevating and training gears are conveniently situated on the left-hand side of the mounting, and the trigger for firing the gun is arranged on the training handle, so that the gunner can have complete control of the firing of the gun without removing his hands from the wheels. By this means the gun can be fired whilst elevating and training, and so send a stream of shots following the target. The sighting gear has been arranged by means of a parallel motion device, so that the gun-layer is easily able to keep the target in view during all angles of elevation.

Mount for 40 mm. automatic gun.

The mounting consists of the following parts:—Pedestal, carriage, elevating gear, training gear, and sighting gear. It is illustrated on page 337.

The pedestal is conical and built up of steel plate, riveted at the lower end to a base angle ring, and at the upper end to a filling piece or bush which forms a bearing for the training worm-wheel which receives the pivot, and also forms a pivot for the training clamp. Towards the lower end of the pedestal is riveted a gunmetal casting, which forms the bottom bearing for the carriage pivot. The training worm-wheel is clamped to the pedestal by means of a powerful band clamp.

The carriage is a steel forging of the usual Y shape, and arranged to allow 80 degrees and 5 degrees depression of the gun. The side cheeks have bearings in the top part for the reception of the trunnions, which are held in position by cap-squares. The lower part of the carriage forms the pivot which rests on an anti-friction bearing in the base of the pedestal. The pivot, which is circular in section and hollow, is provided with roller bearings at the top and bottom, being placed in the worm-wheel and lower bush respectively. The elevating and training gear bracket is bolted to the left-hand side of the carriage.

The elevating gear consists of a steel arc secured to the gun casing front and rear, and is arranged to slide between guides contained in a gunmetal gear box secured between the side cheeks of the carriage. Gearing with the arc is a steel pinion in two parts, arranged to give adjustment in order to take up wear and eliminate backlash. One pinion is keyed to the worm-wheel shaft, the other being connected to the shaft by a spiral key. The worm-wheel is also in two parts for the same purpose, and adjustment is obtained by means of an eccentric screw. The worm-wheel gears with the worm, which is keyed to the bevel pinion shaft. A pair of bevels connect up the hand-wheel, one turn of which is arranged to give 7 degrees elevation of the gun.

The training gear is on the left-hand side of the mounting, and is operated by means of a hand-wheel. The hand-wheel through bevel gears operates the training worm, which gears with the training worm-wheel which is clamped to the pedestal. End thrust is taken up by ball bearings, and an adjusting screw is provided and arranged to take up backlash between worm and wheel. One turn of the hand-wheel

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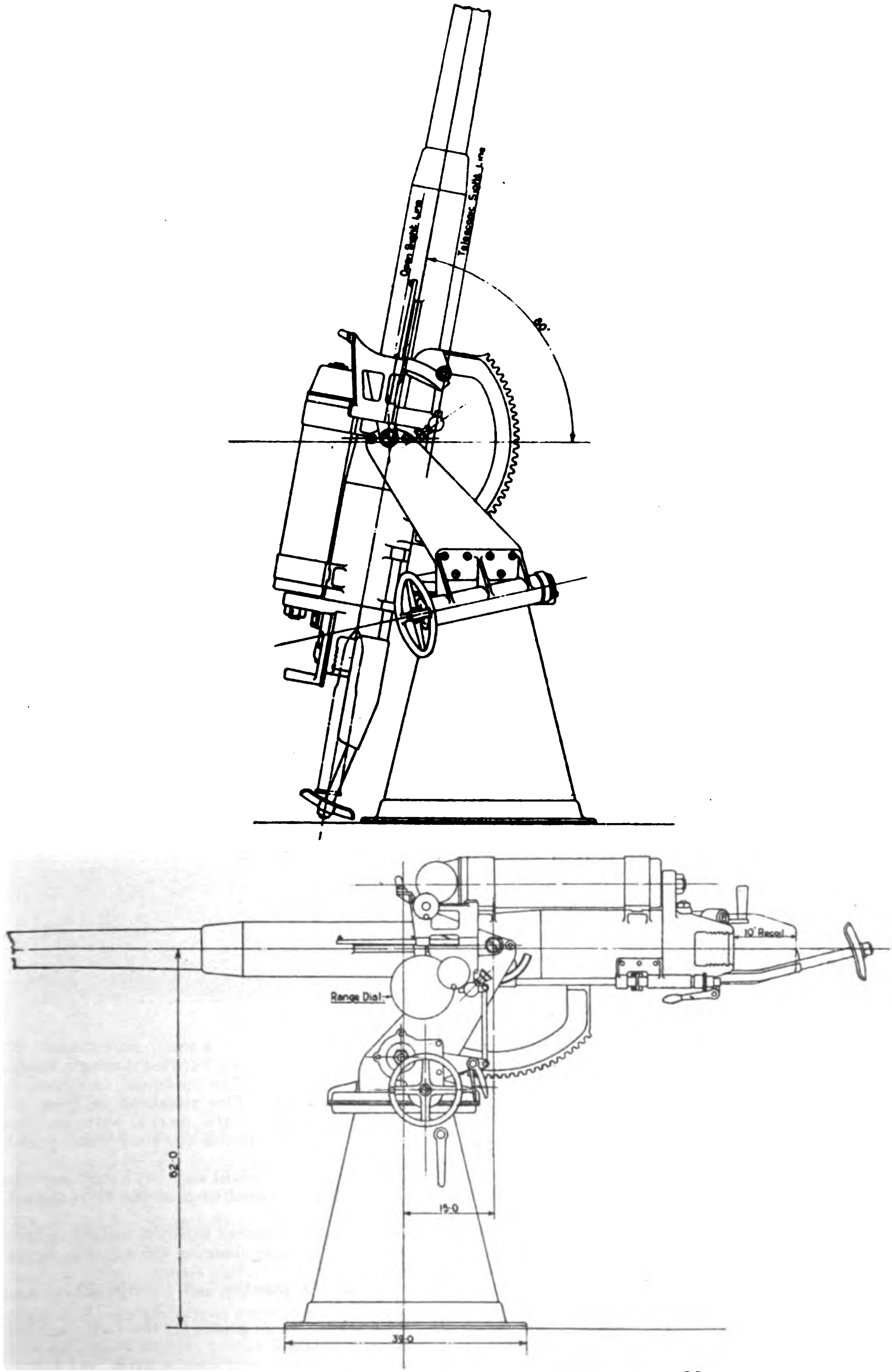

Vickers 76 mm. (3-in.) 45-Calibre Gun on High-Angle Mount.

For use as an anti-torpedo or anti-air-craft weapon.

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will train the gun 7 degrees. The gun is fired from a trigger placed on the training handle.

The sight is so arranged, by means of parallel motion, that the gun-layer can easily follow the movement of the sight.

The particulars of the Vickers 2-pdr. (40 mm.) automatic gun on high-angle pedestal mounting are as follow :—

Weight of projectile, 2 lb.; muzzle velocity, 2000 f.s.; muzzle energy, 55·5 f.t.; length of barrel, 62 in.; total length of gun, 95·6 in.; number of rounds per minute, 175; height obtained by shot at 80 degrees elevation, 14,515 ft.; range at 80 degrees elevation, 2400 yds.; maximum range, 7830 yds.; elevation at maximum range, 38 degrees–42 degrees; elevation, 80 degrees; depression, 10 degrees; training, 360 degrees; speed of elevating and training, 7 degrees per revolution of hand-wheel; height of centre line of gun to base, 46 in.; weight of gun, 495 lb.; weight of mounting, 800 lb.

Adjustable tripod.

The Vickers adjustable tripod is of the lightest possible construction consistent with strength and rigidity. It can be adjusted to suit any height of protection, and is quickly and easily adapted to fire at the higher angles of elevation. The gun is elevated by means of the usual right and left hand screw up to 16 degrees. For greater elevation than this it is only necessary, first, to disconnect the elevating gear from the gun by withdrawing the elevating gear joint pin; secondly, swing the gun and crosshead around through an angle of 180 degrees. The gun can then be elevated up to 75 degrees, and being controlled by means of the handle block-grips, it can be easily trained on to any quickly-moving object, such as an aeroplane. To alter the height of the gun, so as to make use of any convenient cover, it is necessary to loosen the front leg clamps and raise or lower the legs until the desired height is obtained, and then tighten the clamps. The top carriage may then be loosened, and the carriage moved on its guides until the training pivot is vertical, when it can be locked. A training arc provided with a clamp permits a maximum angle of training of 22½ degrees each side of centre.

The following is a description of this equipment, which is illustrated on page 341 :—

The crosshead is made of steel, and is so designed that by a small movement of he trunnion pin, which is a fixture in the gun, the latter may be lifted through slots in the crosshead forks, thus giving a very quick release. The crosshead receives a gun-metal pivot, and is held down by a steel centre bolt. The crosshead is free to move independently of the crosshead arm (which extends to the rear) as soon as the elevating gear is disconnected from the gun by withdrawing the elevating gear joint pin.

The elevating gear is of the usual type and consists of right and left hand screws working in a nut pivoted in the extreme end of the extended arm of the crosshead. A very efficient clamp is fitted.

The top carriage in which the crosshead is pivoted together with the training arc, which is riveted to the top carriage, move radially on the guides on top of the body, and can be securely clamped in any position by the top carriage clamp.

The body consists of (a) side plates, (b) socket for rear leg, and (c) adjusting arcs for front legs.

The top faces of the side plates are radial, and serve as guides for the top carriage allowing the pivot to be adjusted to a vertical position.

The front legs are of steel tubing, fitted at the upper end with a link, which is. pivoted to the adjusting arc and contains teeth to coincide with those on the arc.

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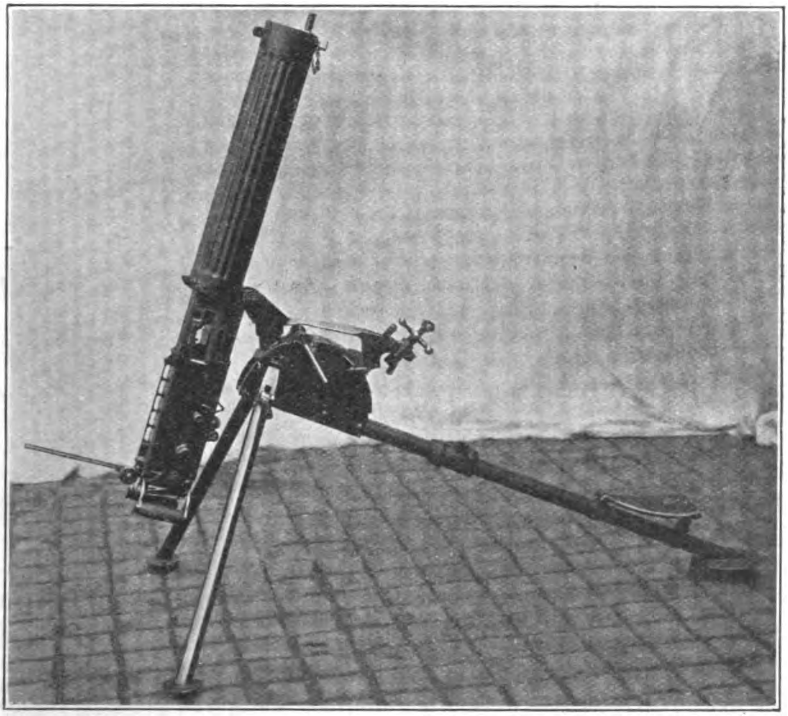
The pivot is fitted with a clamp, and by this means the teeth of the arc and the front leg are thrown in or out of gear. Shoes with spades are fitted to the front legs.

These are securely fixed to the side plates, and contain bearings for the front leg pivots. Teeth are formed on its outer edges.

The rear leg or trail is made of steel tubing, the upper end being rigidly fixed to the body, and the lower end being fitted with a shoe with spade. If it is desired to use the tripod with a pack equipment, the rea: leg requires to be made telescopic, which adds a little to the weight.

The seat is made of thin steel plate, and is connected by a link to the rear leg; at the front it is attached to a sleeve which slides on the rear leg. By sliding the sleeve upward, the seat may be packed close to the rear leg.

The weight of the tripod is 34 lb. = 15·4 kg.



VICKERS ADJUSTABLE TRIPOD MOUNTING.

Arranged for High-Angle Firing.

The advantages claimed for this adjustable tripod for automatic R.C. gun are that the mounting can be adjusted to suit any height of protection, thus enabling the gunner to take any available cover. The crosshead can be disconnected from the crosshead arm if the elevating-gear joint pin is withdrawn. The gun with the crosshead can then be swung round so as to obtain a maximum elevation of 75 degrees. A vertical pivot can always be obtained by means of the adjustable top carriage. In any position the gun may be trained about a vertical pivot without altering the angle of elevation at which the gun is laid, consequently full elevation can be obtained by the

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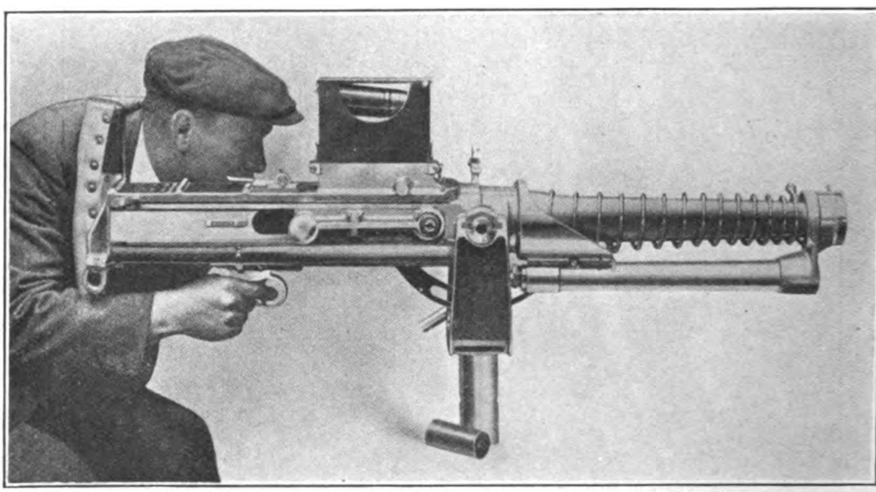
elevating gear at all positions. The training is limited, by stops, to 22½ degrees each side of centre, but by releasing the elevating gear and the crosshead clamp, above referred to, an all-round training can be obtained. The front legs are attached to toothed arcs, which form an adjustment for adapting the mounting to uneven ground. The seat, by means of a sliding sleeve, can be made to lie flat on the trail, so as to be out of the way in the lowest position of the mounting. All parts, moreover, are strong and substantial, and all the clamps are very effective. High-class steel only is used, except for the adjusting nut, which is made of the best gunmetal.



THE COVENTRY ORDNANCE WORKS 1-PDR. AEROPLANE GUN.

Naval mount for automatic R.C. gun.

The naval mounting for Vickers Automatic R.C. gun consists of three principal parts, viz., pedestal, guide bracket, and top carriage. The pedestal is built up, the main portion being of steel plate riveted at the lower end to an angle iron ring, and at the upper end to a training pivot, which allows for all-round training. The guide bracket consists of two arc-shaped side plates with the pivot bearing riveted between them, and on the outer edges of these side plates are radial steel guides for the top carriage to slide upon. The pivot bearing is provided on the left-hand side with a training clamp. On the bottom surfaces of the guide bracket are two arcs which bear upon the plate of the training pivot, and the guide bracket with the top carriage is held down upon the training pivot by a holding down bolt. The top carriage is of steel and is provided at the top with trunnions to receive the gun, and at the rear it is forked to receive the screw elevating gear. The gun can be elevated by means of the usual right and left hand screw elevating gear up to 12 degrees. For greater elevation than this it is necessary to loosen the clasp securing the top carriage to the guide bracket, when the gun can be elevated up to 75 degrees, and depressed to 40 degrees, being controlled by means of the handle block-grips. If the training clamp is loosened the gun can be trained on to any quickly moving air-craft. The gun is fed from an ammunition box on the right hand side of the mounting. The gun with the top part of the mounting, namely, the guide bracket and top carriage, can quickly and easily be removed from the pedestal on board ship, and placed upon the pedestal in the ship's boat if necessary.

The Coventry Company have had under extensive trial a type of 1-pdr. automatic machine gun for use in aeroplanes and airships which is illustrated on this page.

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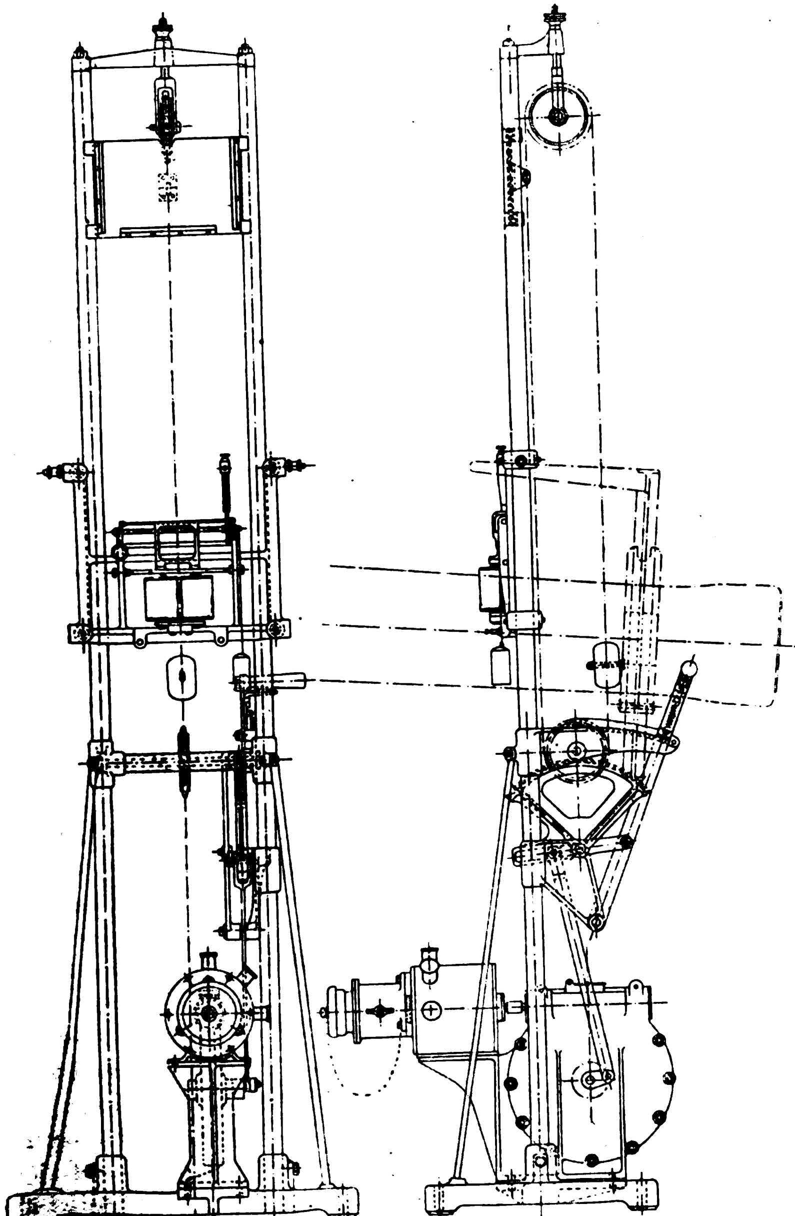
The principle of the Elswick electrically-operated dotter is similar to that of the hand instrument illustrated in last year's *Naval Annual*, but the adoption of electric power renders it much more Electric dotter.



ELECTRICALLY-OPERATED DOTTE FOR B.L. GUNS
Armstrong fitting.

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easy to manipulate and therefore affords far better practice to the gun-layer.

An electric motor operates a worm and wormwheel running in an oil bath and the wheel is provided with a crank and connecting link which operate a quadrant which gears with a pinion. The position on the quadrant to which the connecting link is attached can be varied by means of a lever, and thus the throw of the quadrant and stroke of target can be altered. The pinion previously mentioned drives a chain of the bicycle pattern, to which the target frame is attached, and a balance weight is fixed on the opposite side. The recording mechanism is mounted on the dotter frame and is guided by means of rollers and is driven by a steel fork connected to the gun near the muzzle, so that the elevation or depression of the gun causes the mechanism to move quite independently of the target. The electric motor is controlled by a switch and the small current required can be taken from any lighting circuit near at hand. The man in charge of the dotter can quickly change the travel of the target and speed of working within wide limits.

Resources of private yards.

Owing to the great increase in the calibre and length of guns, Messrs. Vickers, Ltd., decided, some time ago, to construct a new department for the building up of guns in substitution for the plant which had done such good service in former years. This building, which is now completed, is of enormous height, as the guns have to be lowered into the heating pits. The principal bay of the building has a height of 130 ft. above the ground level, and at nearly this height there is a travelling crane capable of lifting loads of 130 tons, the height of the crane above the top level of the heating furnaces being sufficient to enable 16-in. guns 50 calibres long to be raised and lowered out of and into the heating furnaces. The oil tank for hardening the gun tubes extends 70 ft. below the ground level, so that the height from the bottom of the tanks to the roof of the building is 200 ft.

In another part of the building there is a complete equipment of furnaces and oil dipping tanks for hardening and building the 6-in. and other lighter guns. This building has a 15-ton overhead travelling crane. In the other bays of this new gun-building department there are several furnaces for annealing gun tube forgings, the longest being capable of taking forgings up to 75 ft. long. There is also a new straightening press up to 2500 tons pressure. In the same building there will be several machines for cutting off the ends of gun-tube forgings and for cutting test pieces from the gun tubes. In addition to this entirely new department, important additions have been made to the gun machine shops, while the improvements in the armour plant indicated in the previous issue of the *Naval Annual* have been completed and brought into service.

Messrs. William Beardmore & Co., Ltd., during the past year have been fully occupied in their gun factory in the manufacture of 15-in. guns, with their breech mechanisms, and in the armour-plate department have been very busy with the production of armour of all thicknesses.

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The Coventry Ordnance Works have continued their experiments with the electro-hydraulic control fitted to gun-mountings, to which reference was made in last year's *Naval Annual.* Considerable improvement has been introduced into the arrangement, and large orders have been received for this gear to be fitted to existing mountings. Electro-hydraulic control.

Further experiments have been carried out with the Firth Patent Exploder, and large numbers of these are under manufacture at Coventry. The firm has also, after extensive trials, produced a satisfactory nose fuse for high explosive shell, the manufacture of which is being proceeded with on a large scale. This fuse has been found perfectly safe in the gun, and will also withstand very rough usage, while at the same time it is so sensitive that it will act at all fighting range velocities when fired from a 4-in. gun through a mild steel plate $\frac{1}{8}$ in. in thickness, the shell detonating within 3 ft. of the rear of the plate. The advantages of a fuse of this kind for small and medium calibre shell used in fixed ammunition are obvious. The firm have also designed a satisfactory time fuse for high explosive shell for use against aeroplanes and dirigible air-craft. Fuses.

The hydraulic gun-mountings for the Ajax and Benbow have now been completed by the Coventry Ordnance Works. Various improvements are embodied in these mountings to meet the requirements of the British Admiralty, particularly in gun-loading cages. By means of these improvements the times of the operations have been reduced and the mechanisms generally simplified. Trials are being carried out with a new design of loading arrangement, in which the projectile and charges are hoisted up the central trunk in separate compartments, and are independent of each other. Suitable waiting positions are provided under the guns, so that it is possible to have two complete rounds per gun ready for transference to the gun-loading cages. The firm have also a considerable number of 15-in. guns and mountings under manufacture at Coventry. Heavy guns and mountings.

Further trials of the Holstrom breech mechanism continue to prove its usefulness under all circumstances. A 6-in. gun fitted with this mechanism fired at an official trial fifty rounds in 300 seconds with full charges, and could apparently have continued to fire at that rate indefinitely. The absence of any tendency of the obturator to stick or jam in the seating is of the greatest importance, and all results obtained with this mechanism under severe experimental conditions confirm its reputation for smooth and reliable work. Breech mechanism.

As a result of recent trials, several improvements have been embodied in the Coventry-Laird machine gun, to which reference Machine guns.

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was made in last year's *Naval Annual.* The extreme lightness and portability of this gun have been demonstrated to have great value. These guns are illustrated on page 347.

In the *Naval Annual* for 1910, in an article dealing with Canadian resources for naval shipbuilding and equipment, reference was made to the forthcoming development in this direction of the Nova Scotia Steel and Coal Company of Canada. In 1912, this company began the installation of a modern forging plant, which has replaced the hammer shop which served for the production of forgings. An addition has also been made to the plant by the installation of hydraulic presses for the fluid compression of steel ingots by the Harmet Patent Process. This includes one group of presses of 1200 tons and one single ingot press of 4000 tons. Both presses are fitted with hydraulic pumps and all necessary and accessory equipment. The company can now undertake the manufacture of forgings of all kinds up to 40 tons in weight. A laboratory has been fitted and equipped with the necessary apparatus for research work. In the last two years the development in the iron and steel industry of the province of Nova Scotia has been most marked. Not only the Nova Scotia Steel and Coal Company, but the Dominion Iron and Steel Company, which was also referred to in the *Naval Annual* for 1910, has made further advances. There have been improvements effected as well in the East River of Pictou, which is being deepened to give a sea-water channel suitable for ships with a draught of 25 ft. The town of New Glasgow, and in particular the Trenton plant of the Scotia Company, will be upon tide water when this work is completed next year.

Empress of India trials.

Trials were carried out against the battleship Empress of India last October in West Bay, off Portland. This ship was one of the Royal Sovereign class, built in 1893, and her belt of composite armour varied in thickness from 18 in. to 5 in., extending over a length of 250 ft. out of a total length of 380 ft. The belt terminated in armoured bulkheads 16 in. thick, and behind the armour were coal bunkers, which were filled with ballast for the occasion. The protection on the barbettes was 17 in. thick. Naturally, this armour gave nothing like the protection which armour of similar thickness of the type employed to-day would give. The trials were not of the same character as those which were made with the Belleisle, the Hero, and the Edinburgh, and in which the object was to determine the result to the ship and her equipment after bombardment at various ranges, and the values, destructive and incendiary, of certain classes of projectile. When the Edinburgh was attacked in 1909, lyddite as well as capped A.P. shell were fired, but the heaviest

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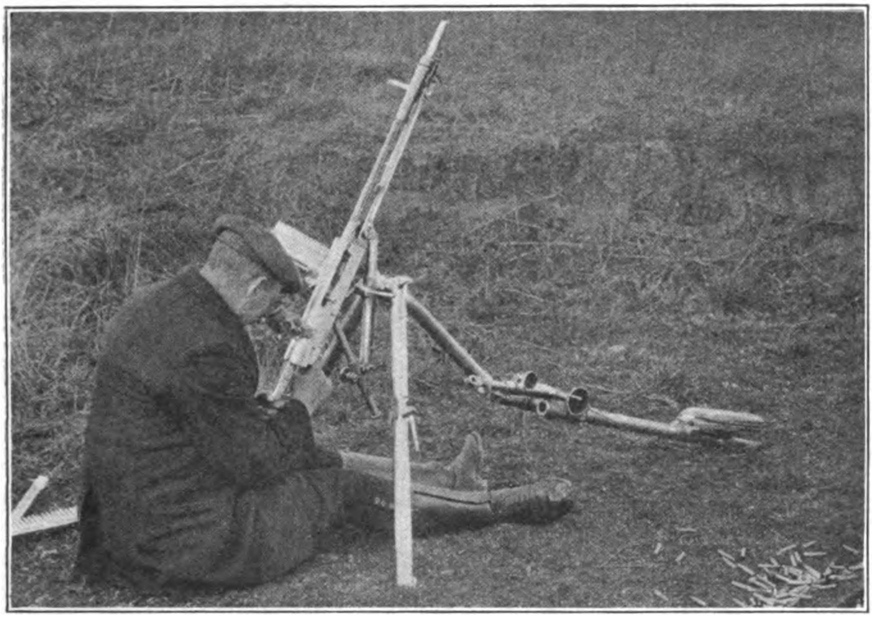
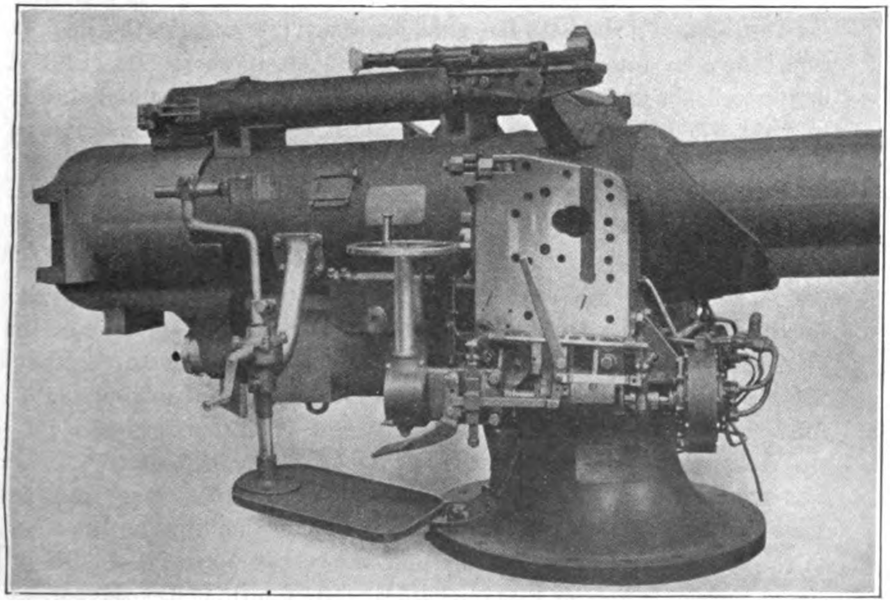


Coventry Ordnance Works Machine Gun.

On High-angle Mounting.



Coventry Ordnance Works 6-in. Power-Worked Mounting.

With Electro-Hydraulic Control.

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projectiles used against the Empress of India were those of her own guns, which were fired from the guns of similar calibre in the later Dreadnoughts. The ship was not towed, and firing was made both by single ships and squadrons at short ranges, with the gun-layers sighting, and at longer ranges, using methods of control and director firing. The results of the firing were confidential, but it was reported that the ship was set on fire by a projectile from one of the smaller ships, and that very shortly after the first salvoes from the larger vessels had knocked a large hole in her side, and cut up all the unarmoured portions of the vessel, that she turned over and sank.

Control and direction of fire.

In last year's *Naval Annual* the twin subjects of control and direction of gun fire were dealt with fully. It is often suggested that these two things are rivals one of the other. They are not. Two factors are necessary to enable a ship to use her guns effectively—first, a system of firing the guns simultaneously in salvoes; secondly, a method of finding out where to point the guns so that the enemy will practically steam into the salvo, or, in other words, his position must be predicted at the time when the flight of the projectiles is ended. These two are complementary parts of the same problem. So far as the first is concerned, the means have been provided by Scott's director, which, after it had been tried in the Neptune and Thunderer, was ordered to be fitted in all ships, and by the end of 1914 all Dreadnoughts will be so fitted.

The idea of firing all the guns together is to prevent the smoke from one gun interfering with the laying of another. It will be understood, for example, that in a ten-gun battleship steaming head to wind, when the two guns of the foremost turret fire a shot at every 25 seconds, which is about the period required to load, then at every 25 seconds an almost opaque mass of smoke or vapour passes along the side of the ship and obscures the target from the other eight guns. The ship may thereby be reduced to a two-gun battery, instead of one of ten guns. Moreover, when firing independently, it is difficult for the spotter aloft to give directions to the different guns how to alter their sights. But in firing a broadside, it is easy to see whether the salvo falls on the target or short of it. By careful calibration, a broadside salvo should fall within a space of 200 yards.

With regard to the second factor mentioned above, there are, as was explained in this section in last year's *Naval Annual*, various methods in vogue for determining the position of the target at the time of the fall of the shot. What system has been adopted for the Navy has not been officially stated, but Mr. Churchill, in the House of Commons, in reply to an interrogation, said that it was intended to rely on one which had been developed by Service experts.

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FOREIGN POWERS.

Of foreign progress in matters relating to armour and ordnance there is little to record, partly, perhaps, because no great progress has been made, but mainly because the governments concerned are not inclined to be communicative. The course pursued in this section is to deal as far as is possible with events and matters of current interest as they are discussed, and to give such information on practical matters as has become accessible. Controversial points, moreover, arise from the discussion of foreign authorities which may suitably be dealt with here. Such, for example, are the continued efforts made in Germany and other countries to belittle the value of British wire-wound ordnance, and statements are made and circulated on this subject which call for correction. The opinions expressed by the Secretary of the United States Navy with regard to the desirability of establishing a State armour factory are not without interest.

GERMANY.

Length German guns.

Details and ballistic particulars of the new Krupp heavy ship and fortress guns were given in the *Naval Annual* last year, and the 1914 tables indicate no changes in regard to them. They are 15-in. and 16-in. guns, each shown in 40, 45 and 50 calibre lengths, but the German official table of ship guns, which is inserted for the first time in the *Taschenbuch* of 1914, does not include the 16-in. gun—this doubtless being designed for fortress emplacements—and it gives the 15-in. gun only in the length of 45 calibres, the particulars corresponding with the heavier pattern of the same gun given in the Krupp tables. There is some doubt concerning the character of the eight 15-in. guns which are to be mounted in the battleships Ersatz Wörth and T, being the first German ships to be armed with bigger guns than the 12-in. Notwithstanding the indication of a 45-calibre gun in the official table, Rear-Admiral Witschel, in an article in the *Neueste Nachrichten*, affirms that the guns for the new battleships will have a length of 50 calibres. This gun, he says, will have an initial velocity of 3084 f.s. and muzzle-energy of 112,300 f.t., and will perforate 55·5 in. of steel at the muzzle with a projectile of 1675 lb., which will also go through the thickest armour yet made at the greatest fighting ranges. These particulars refer to the heavier pattern of the Krupp 15-in. 50-calibre gun in the Krupp tables, which has a weight of 91 tons. The *Taschenbuch* gives no indication of the length of the gun to be mounted in these ships.

Last year reference was made in the *Naval Annual* to the reiterated assertion which comes from Germany of the inferiority of

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British guns. There is no reason to doubt that German guns are of great excellence, and German officers have complete confidence in them, but the fact that the Imperial Navy Office has decided to advance at a single step from the 12-in. to the 15-in. is evidence enough that they were not content with the performance of the former, although they assert that the development is due merely to the requirement of greater range. It is still asserted that British guns droop at the muzzle, that their "life" is short, and that we would willingly adopt the "built-up" system of construction if our ordnance firms had not sunk so much money in plant for the making of wire-wound guns. The extent to which the campaign against British guns is carried may be seen from the fact—the statement being based on the reports of those who are interested in the production of German guns—that in the official report on the Italian Navy Estimates, there is given a table ostensibly showing the inferiority of British ordnance from the point of view of endurance. The table is as follows:—

German "built-up" 12-in. 50-calibre gun .	220 rounds.
French 12-in. gun	200 „
Japanese 12-in. wire-wound 50-calibre gun .	80 „
British 13·4-in. „ 45-calibre gun .	60 „
Italian 12-in. „ 46-calibre gun .	80 „
United States 14-in. "built-up" gun . .	150 „

Foreign attack on wire-wound guns.

Basing its conclusions on this table, we find the Austro-Hungarian semi-official *Mitteilungen*, published at Pola, declaring that the inferiority of the wire-wound system is demonstrated. But the remark may be made that the view expressed by the Italian reporter on the Estimates does not prevent the Italian naval authorities from proposing to mount in their coming big ships two-thirds of wire-wound ordnance, intended to be produced by the Vickers-Terni works at Spezia and the Armstrong company at Pozzuoli, and admitting but one-third on the built-up principle, from the new Ansaldo works near Genoa. It may be well at this point to set forth the arguments of Admiral Witschel. He says that the development of the torpedo and the increase in its range have brought about an extension of the battle range to 12,000 yards or more, and that this is the reason for the continued increase in the power of the heavy gun. It explains why in the British Navy the calibre of the heavy ordnance is being raised. With Krupp guns the Germans say they are able, to some extent, to attain the desired power by lengthening the gun, thus gaining greater initial velocity, and also by using longer projectiles. The Admiral asserts that this is the more economical way in view of

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the notable saving in weight. In the Helgoland class the 12-in. gun was introduced owing to the continued increase in battle ranges, which had risen in 1908 to 6500 yards. This gun was of 50 calibres, with initial velocity of 3084 f.s., and could penetrate 42 in. of armour near the muzzle. It weighed only 48 tons and could fire one and a half rounds per minute—the German official table says one round only—and yet was approximately equal under battle conditions to the English 13·5-in. gun, which weighed 76 tons. From this the Admiral proceeds to say that wire-wound British guns cannot sustain a further increase in muzzle velocity, besides being considerably inferior in construction and material to built-up Krupp guns. Then, too, according to Admiral Witschel, the durability of Krupp guns is practically unlimited. He says the 12-in. 50-calibre gun is not worn out until 220 rounds have been fired. He asserts that wire-wound guns are deficient in longitudinal strength, and exhibit a tendency to droop, which prejudices accuracy. The efficiency of built-up guns he estimates at about 30 per cent. more than that of wire guns, and finally asserts that their advantages of higher initial velocity, energy, flatness of trajectory, accuracy, lighter weight, and longer life cannot be disputed.

In his opinion the British Navy would revert to built-up guns were it not that their adoption would involve a complete revolution in the existing manufacturing system, plant, and methods of work, and a training of the staff of the ordnance firms, which would require many years.

A German Admiral's view.

The Admiral arrives at the conclusion that, in order to increase the efficiency of our heavy ordnance, we have been compelled to raise the calibre, thereby obtaining a heavier projectile of reduced initial velocity. This means a smaller propelling charge and less erosion of the gun, which can be made relatively lighter and shorter. Heavier projectiles, he admits, have an advantage in their penetrative power being greater at long distances, and they are less susceptible to wind and atmospheric conditions than lighter projectiles; the trajectory is flatter, and the larger bursting charge is more destructive. The bursting charge, he says, in a 15-in. A.P. shell weighs 68 lb., against the 24 lb.-burster of a 12-in. projectile.

All this is interesting enough, but it is based on arguments which come from a source that has a practical concern in belauding the quality of German guns to the disadvantage of British ordnance. Not all Admiral Witschel's figures are in accord with the German official table. For example, he says that the 9·4-in 40-calibre gun was mounted as the main armament of the Kaiser and Wittlesbach classes primarily for the sake of homogeneity, and also in view of the

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need, at that time, of keeping down displacement, but justifiably because the gun was little inferior to the 12-in. gun of other navies in power and penetration, and that its rate of fire, which he states to be three or four rounds per minute, gave it a great advantage. But the German official table states the rate of fire of this gun to be one and three-quarter rounds per minute, and its muzzle energy and penetration are shown as inferior to those of the British 12-in. gun. There is no such catalogue of misfortunes in the case of British heavy guns as the Admiral suggests. It would be an easy thing to make a wire-wound gun lighter than the built-up German gun, but ordnance designers have wisely added weight in order to give stability and security. The 60 rounds which are assigned as representing the "life" of the British 12-in. gun are a nominal figure, for with service charges the gun can fire up to 160 rounds, and the 13·4-in. 45-calibre gun is good for 450 rounds. The facility with which wire guns can be re-tubed is an advantage which built-up guns do not possess. Light guns have disadvantages which do not seem to be realised everywhere, and a well-informed writer in *Engineering* (Sept. 26th) has shown that the energy of recoil is in the inverse ratio to the weight of the gun, and that a gun of very light weight has a correspondingly large amount of recoiling energy. This energy can only be absorbed by arranging for a sufficiently long recoil, or by strengthening the whole structure of the mounting in order to resist the high stresses produced. In either case the weight of the mounting must be increased. Further, it is clear that even if the light gun be sufficiently strong, an economy in the weight of the gun does not generally mean a reduction in the total weight of the armament, if due regard be given to questions of strength. "The ballistic tables compiled abroad for the purpose of showing off light guns give a high initial energy per ton of gun; but these tables ignore all particulars of the mounting and other equally important factors, and consequently impart an entirely fictitious impression." The fact that British shipbuilders are successful, not only in building British ships, but in securing large orders for foreign ships to be armed with wire-wound guns, which give complete satisfaction, is proof enough that the wire system has advantages which make it superior to foreign guns of the built-up type.

New Krupp 4-in. gun.

Passing from this controversial question raised in regard to main armaments, we note that of lighter guns for ship mounting, the Krupp Company have introduced a new rapid-fire 4-in. 50-calibre magazine gun, as an anti-destroyer weapon, mounted on pedestal base, with shield. The opening of the breech, ejection of the spent cartridge, loading of the new cartridge, and closing of the breech are

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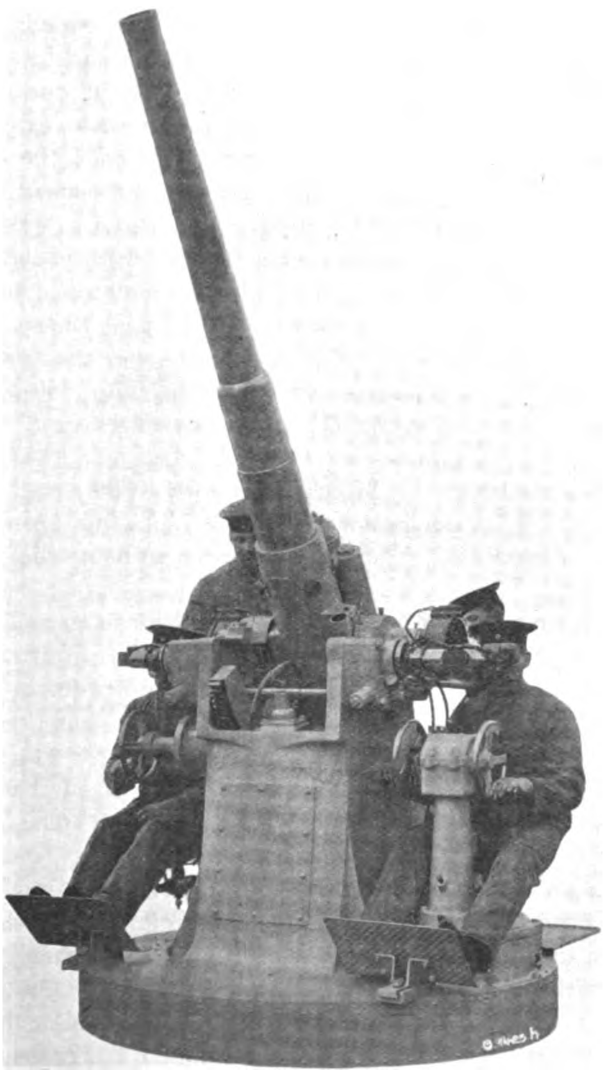
worked automatically. In case of necessity one man can serve the gun, though three men usually form the gun's crew. The breech block is a self-acting, sliding crank mechanism, with every necessary



KRUPP 3·4-IN. HIGH-ANGLE GUN.

security appliance, and can be worked by hand. The gun-cradle incloses the gun-barrel, and is fixed with the trunnions to the pivot mounting. Recoil is controlled by a fluid compression brake.

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and two springs, which bring the gun into position again after recoil, with the brake, are beneath the gun-cradle. The magazine is placed upon the cradle, but does not move with the recoil. It holds, according to the calibre, five or six cartridge projectiles, making six or seven with the one ready loaded. The gun can, however, be used for individual firing, in which case the magazine remains filled. Automatic firing mechanism is provided. The recoil extends the opening and closing spring of the breech as well as the magazine spring, which is held extended by catches. Just before the end of the recoil is reached the breech is opened by the freeing of the opening spring, and the spent cartridge is ejected. This sets free the spring of the magazine, whereby the rammer is brought into action, and this mechanism brings the loading-tray, with the lowest cartridge, behind the breech, and drives the charge into the loading-chamber. At the same time a spring is set free whereby the breech is closed for firing, and the loading-tray falls back, enabling a second cartridge to come into position for the next round. With a magazine for five cartridges from thirty to thirty-five rounds a minute can be fired. The gun is 17 ft. 3 in. long and weighs, with the breech, 42·3 cwt. The weight of the projectile is 35·3 lb., the initial velocity 3067 ft., and the maximum range over 13,500 yards. The gun-mounting, without shield, weighs about 68 cwt.

Krupp high-angle guns.

In Germany, as in other countries, anti-balloon guns are being mounted in ships, and the Krupps show three patterns for the purpose—a 12-pdr. of 45-calibre length, and a 3·4-in. in 35- and 45-calibre lengths, mounted for high elevation on trunnions in the centre of gravity of the gun and mounting. A longer gun (4·1-in.) is described as for coast-mounting. The illustration on the previous page shows the 3·4-in. ship gun as used in action. The angle of elevation is 80 deg., or with a shield mounting, 60 deg., and the depression angle 10 deg. in both cases. In the horizontal direction the gun fires round the whole circle. The projectile, which weighs 21 lb., has an initial velocity of 2067 ft. in the shorter gun, and 2628 ft. in the longer, and from 20 to 25 rounds per minute can be fired. The weight of the 35-calibre gun is 68 cwt., and of the longer gun 115 cwt., its shield, which has a maximum thickness of 2 in., weighing 47 cwt.

United States.

When Mr. Josephus Daniels assumed the Secretaryship of the United States Navy, he was impressed with the growth of expenditure, and thought he saw opportunities of effecting reduction of

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prices by entering into competition with the three firms which supply armour to the Navy. He urged Congress to provide an appropriation for the construction of a Government armour plant in order to relieve a situation that seemed to him intolerable. If effect should be given to his recommendation the experiment would be watched with considerable interest, because the Bethlehem, Carnegie and Midvale companies control enormous and costly plants, in which they have sunk large sums, and they are always ready to conceive, adopt, and perfect any process or mechanical improvement that presents itself. Mr. Daniels himself admitted, in a message to the Senate, that armour was produced more cheaply in the United States than elsewhere, though the prices seemed to him still to be excessive, and he was impressed by the fact that when competition was threatened in the matter of thin plates, the companies made lower tenders, and that, also in competition, they supplied armour more cheaply to foreign navies. Practical people are not all agreed with Mr. Daniels on this matter, and legislators are not desirous of spending great sums on plant which new discovery may at any time render valueless. Mr. Daniels seems himself to see this point without realising the consequences. His arguments are interesting, but he is in error in ascribing to naval officers improved processes in the manufacture of armour, and his admiration for the Russian system is qualified by his knowledge of the fact that foreign capital and management have been invited to make the works a success. This is what the Secretary says:

I am convinced from the reports made to me by experts who have gone carefully over the subject that we can make armour much cheaper than we now buy it, and that, from an economic point of view alone, the erection of a Government plant is amply justified. By manufacturing armour-plate in its own plant the Government will be able to keep for its own use any improvements in the manufacture or composition of its armour that may be developed. The last word has not been said on armour, and past history shows that great improvements in the manufacture and design of armour-plate have been made. The greater part of these improvements were suggested by actual experience gained by naval officers. Under our present system of obtaining our armour plate from private companies such improvements become the property of all the world, and can be obtained by anybody who cares to buy them. Even now the improvements in armour and the designs worked out by the Navy have been embodied in the warship of another nation recently finished by the Bethlehem Steel Co. and put into commission. This is not an argument likely to be disregarded in favour of a Government armour-plant, nor has it been overlooked, for instance, by Japan, which has erected its own armour-making plant and surrounded it with such secrecy that none of the other nations are able to tell whether or not at this minute the Japanese armour may not be superior to any other in existence. In addition to Japan, the French Government, after experimenting with a factory capable of producing only the lighter weights of armour, is enlarging its Government plant so as to permit of the production of thick plates, and Russia has had its own armour-plate factory for some time.

The Bethlehem Steel Company, thus criticised by the Naval Secretary, have recently been busy in producing armour-plate both for the United States and foreign navies. The point of view of the

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manufacturers is that the prices obtainable for the former are not very remunerative, considering the high standard of quality required by the Navy Department. It is customary, they say, in Europe to fire at plates with uncapped armour-piercing shell, but at the American Navy proving ground all armour-plate acceptance trials are carried out with capped shell, the projectiles themselves being almost always of crucible steel. It is incorrect to suppose that the value of the armour-piercing cap is almost negligible at comparatively low striking velocities. Many authorities place the lowest velocity at which any increase of penetration due to a cap may be obtained as 1800 f.s., but repeated trials and experiments carried out

BETHLEHEM TRIAL PLATE FOR THE BATTLESHIP OKLAHOMA.

at the Government proving ground at Indian Head, and also at the Reddington proving ground of the Bethlehem Company, have shown that the capped crucible armour-piercing projectile is very superior to the uncapped shell at low velocities.

U.S. armour-plate tests.

The United States Navy is supposed to be obtaining its supplies of armour at lower prices than other navies, while, at the same time, the ballistic trials are of more severe nature than is usually demanded in Europe. Early in 1914 the authorities of an important European naval Power were carrying out experiments with a thick armour-plate of exceptionally good quality, and even at velocities considerably above the specification requirements, the projectiles, which were

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uncapped, were broken up into small fragments. It was then decided to try the resistance of the plate, using the same make of projectile with standard A.P. caps fitted. The velocity was reduced to normal specification requirements, and the result was that the plate was perforated, and the projectiles were recovered whole. Neither the plate nor the projectile was of American manufacture, and this experiment is only referred to as bearing out the severity of testing armour-plate with modern capped projectiles.

On page 356 is shown an illustration made from a photograph of a Bethlehem armour-plate after passing through its acceptance trials at Indian Head. The plate formed the ballistic trial plate of one "lot" of armour for the battleship Oklahoma, and in considering the resistance of this plate it is necessary to bear in mind that the projectiles employed were capped.

The following figures show the principal ballistic figures connected with the trial:—

ARMOUR PLATE—Thickness of Plate, $13\frac{1}{2}$ in., tapering to 8 in.

Number of round	1	2	3
Calibre of projectile	12 in.	12 in.	12 in.
Type of projectile	Crucible A.P. capped	Crucible A.P. capped	Crucible A.P. capped
Weight in lb. of projectile	870	870	870
Striking velocity, f.s.	1560	1461	1548
Striking energy, ft. tons	14,695	12,889	14,469
Thickness at point of impact	$13\frac{1}{2}$ in.	$12\frac{1}{8}$ in.	$13\frac{7}{16}$ in.
Actual penetration	$1\frac{3}{4}$ in.	$1\frac{5}{8}$ in.	3 in.
Dish	Nil	$\frac{1}{4}$ in.	Nil
Diameter of spall	29 in. × $39\frac{1}{2}$ in.	Nil	25 in. × 31 in.
Diameter of impact	10 in. × 10 in.	4 in. × 5 in.	12 in. × 20 in.
Cracks	Nil	Nil	Nil
Effect on shell	Wrecked	Wrecked	Wrecked
Effect on plate	No cracks	No cracks	No cracks

Bethlehem gun-mountings.

In the matter of heavy guns and gun-mountings, more especially in guns of 14-in. calibre, the Bethlehem Co. is producing many sets, together with two-gun and triple turrets. The latter are of two types—namely, those with three cradles and sets of elevating gear, and those with all three guns in a single cradle, which is, of course, provided with a single set of elevating mechanism. As is generally known, the United States Navy have adopted the last mentioned types—and extensive experiments have proved that it possesses many advantages—and that no difficulty need be experienced in getting all three guns to range alike. This will, doubtless, prove interesting to those who remember how short a life the twin cradle for 6-in guns enjoyed in the British service. Although the United States do not

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build many battleships a year, it is said that they adopt a greater number of new principles or modifications than any other navy, and these modifications run in the direction of simplicity. To those familiar with the interiors of British and American turrets, the former seem crowded compared to the latter. Whatever difference there may be in the designs, there seems to be very little difference between the rates of fire, and very little difference in the hits per minute as recorded.

During the last few years the Bethlehem Co. has shared with British ordnance firms in armament orders given for ships built outside the countries of the purchasers, and few orders have fallen either to the large German or French firms, which do not seem able to establish the same enviable reputation for naval ordnance as they possess for field guns.

6-in. casemate mountings.

The Bethlehem Co. is now producing 6-in. guns mounted in special casemate mountings, the principal feature of this arrangement being the size and shape of the shield, which is almost a circle, with a narrow opening at the rear for the gun. The elevating and training numbers and the gun-layer find accommodation within the shield, and the cross-connected sights are placed close up to the front of the shield in order to keep the sighting apertures as small as possible. The gun-layer's station is in the rear of the training position on the right-hand side of the gun, which position is rendered possible by the fact that the Bethlehem "two-hand" drive is employed for operating the training gear instead of the large single wheel which is practically standard practice in Europe. Owing to the gun's crew being within the shield, an extraordinarily large training angle is obtainable—varying with different position along the ship's side, but averaging about 170 deg.—for the guns of a modern battleship. Following the American Navy practice for guns firing bag cartridges, an air blast for clearing the bore is fitted, a telescopic pipe conveying the compressed air to the breech-screw box. This type of mounting was originally designed for the Argentine battleships Rivadavia and Moreno, but has since been applied elsewhere.

The Bethlehem Ordnance Works are being considerably extended, not only by increasing the plant in existing departments, but also by building new fuse factories and shell-loading plants. Their long-nosed shell with flat trajectory for anti-torpedo guns is well known. Recently the Corporation have acquired the Fore River Shipbuilding Co., and now control two shipyards on the Atlantic and one on the Pacific. They have also bought immense iron ore properties in Chile, which, with their mines in Cuba, will enable them to supply all the ore needed, and will leave them with a considerable surplus—

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some of it, perhaps, for export to Europe, as soon as the Panama Canal is open for traffic. They are building a fleet of ore-carrying steamers.

Some of the later United States submarines will carry guns, and the Bureau of Ordnance placed contracts for twelve guns for the purpose. This was decided upon as a result of a long investigation of the subject, and it has been concluded that a 3-in. gun of much the same type as the Ehrhardt landing gun for naval purposes will meet all the requirements of the situation. This gun will be mounted in a well in the submarine and will be installed on an elevating apparatus, which, as the gun is raised, will carry with it a part of the deck plating, which will serve as a metal covering and protective shelter for the gunner, who will also have a position on the gun platform. There will be a device for lowering the gun whenever it is necessary to carry it below deck; it will not disappear by operation of its recoil as in the case of the disappearing guns of the coast defences. Every consideration has been given to the question of saving weight as far as may be, and the installation will be on the basis of sustaining the pressure at a depth of 200 ft. Guns for sub-marines.

In the United States Navy, and many others, the gyroscope is being applied in many directions, and not least to secure the extreme accuracy and precision which are necessary for successful work in gunnery and torpedo. The torpedo-directors now used in the British Navy are connected through automatic operation with the gyro-compass. The compass also serves to operate range clocks, and is in some cases applied to keeping the range-finder on the target. It is found to be of much value in gunnery, not only because of the fact that it lends itself to the fire-control instruments, but also because the ship can be kept on an even course, thus making it easier for the gunlayers to keep on the target. Gyroscope applica-tions.

In some modern Dreadnoughts, where the standard compass is near the forward smoke-stack, a shift in the wind from forward to aft will cause a change in the deviation of from 2 deg. to 5 deg., by reducing the cooling effect of the air on the steel of the smoke-stack. Records show that when steering by even the best magnetic compasses the constantly changing deviation gradually leads the ship from her true course.

In submarines, where accuracy in under-water navigation is absolutely essential, little dependence can be placed upon the magnetic compass because of the inaccuracies introduced by stray magnetic fields from the cables. The deviation caused by these stray magnetic fields changes with the load on the cables and with the changes in the fore and aft inclination of the keel.

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The gyro-compass.

The gyro-compass has come much into use within recent years. It depends for its operation on a phenomenon which is absolutely changeless and undeviating—i.e., the rotation of the earth. The inertia of a large wheel is relative to space—that is, it will, if freely suspended, maintain its original plane of rotation in space. If any angular force is impressed on the rotating wheel, it will not turn in the plane in which the force is acting, but will turn in a plane at right angles to that of the impressed force. This movement is termed "precession." The wheel always "precesses" in such a direction as to place its plane of rotation in the plane of the impressed force by the shortest path. Because of these two characteristics, a rotating wheel, properly suspended, will, when subjected to any angular motion, place its plane of rotation coincident with the plane of that angular motion.

In the gyro-compass a rotating wheel, suspended with its axis horizontal, with freedom partly suppressed about its horizontal axis, and with perfect freedom about the vertical axis, is acted upon by the earth's rotation in such a manner that the earth's motion causes the gyro to place and keep its plane of rotation East and West, in which case its axis is in the North and South meridian.

Sperry type.

Notwithstanding the many difficulties surrounding the development of the gyro-compass, great progress has been made, and in the United States the solution of these problems is exemplified in the Sperry gyro-compass in a practical and successful manner. This instrument is now in operation or in process of installation in fifty-seven vessels of the United States Navy, thirty-five of which are battleships and twenty-two submarines. This compass has recently been installed in the St. Vincent, and in submarine E 1, and Australian submarines AE 1 and AE 2. Installations have also been carried out in ships in the navies of Germany, France, Russia, Italy, Denmark, Japan and Brazil.

An elementary section of the Sperry gyro-compass is shown on page 361, of which the following is a description :—

The section is made through the vertical East-West plane. The spider J is suspended in ordinary gimbal rings K. The stem H is rotatably mounted in the spider J by means of ball bearing Z. Attached to the stem H are the compass card O, the large gear N and the ring G. Suspended from this stem by means of a wire E is a vertical ring D. The gyro wheel rotates about the axis A, held in ball bearings in the casing B. This casing is rotatably suspended in the ring D by means of horizontal pivots C. The gyro wheel with its casing and the ring D are collectively termed the sensitive or gyroscopic element. Rising from the ring D is a small post carrying the contact wheel V_1. This post passes through the outer ring G without touching it. The contact wheel rests on contacts W_1, which are attached to the frame fixed to the stem H. In turning to seek and maintain the meridian the gyro turns about its vertical axis. Any tendency to turn about this axis moves the contact wheel V_1 on to one side or other of the pair of contacts W_1. The contact wheel co-operating with the contacts W_1 controls the small motor M which, by means of the gear N, moves the stem H, the compass card O, the ring G, and all

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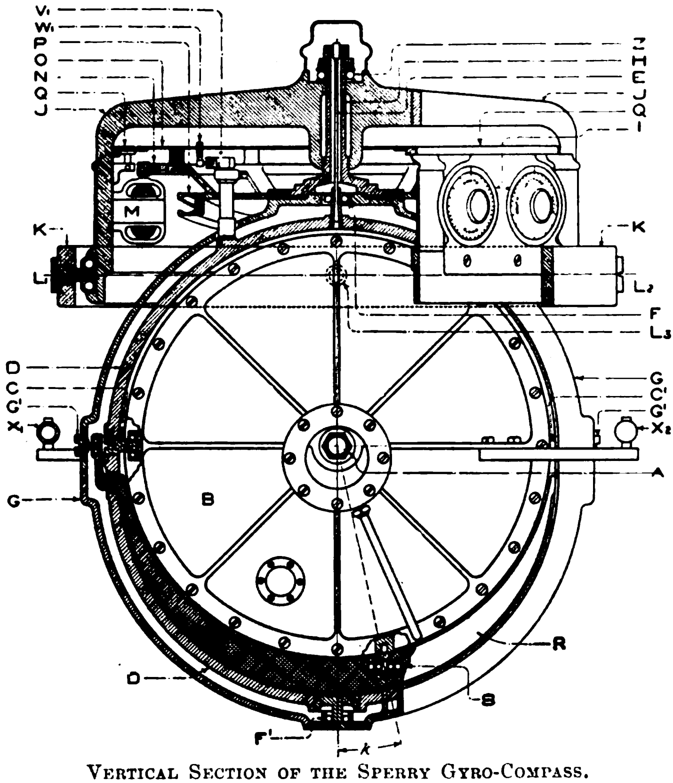
attached parts, to hunt the sensitive element. All the work of turning in seeking the meridian is therefore assumed by the small motor M, so that all the directive force of the gyro wheel in its tendency to place its axis North and South is useful, and the compass is very accurate. The only friction which the gyroscopic element encounters when turning about its vertical axis to seek the meridian is the very minute friction of the contact wheel V_1 rolling on the contacts W_1. It will be seen that the ring G is held in practically constant relation to the gyroscopic element, but is nevertheless quite independent of it mechanically. The ring G may therefore be used as a base from which to suppress the freedom of the gyro wheel without interfering with its directive force. Freedom is suppressed by the pendulum R, which is suspended in the horizontal pivots G^1. It will be noticed that the arms of the pendulum pass through the vertical ring D without touching it, and that the pendulum is attached to the gyro casing at S eccentric to the vertical axis of the gyro wheel.

To understand the action of the compass, let it be supposed that the wheel has just been brought to full speed, and that the axle A is



Vertical Section of the Sperry Gyro-Compass.

pointing East. The earth in turning moves our horizontal in space. The gyro, by reason of its rotation, tends to maintain its plane in space. This results in an apparent inclination of the axis of the gyro with relation to the earth's horizontal. The inclination takes place against the weight of the pendulum R, which presses downwards about the horizontal axis, thus causing "precession" of the axis of the gyro towards the North and South meridian. As the pendulum is

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attached to the gyro casing at a point eccentric to its vertical axis, the pendulum will also act about the vertical axis, thus "precessing" the axis of the gyro back to the horizontal. Under these circumstances the gyro can have but one position of equilibrium, and that will be with its axis pointing North and horizontal. We therefore have a compass which constantly seeks and maintains the North and South meridian.

Master and repeater compasses.

The compass described is called a "master compass," and is placed in a protected position below the water-line and behind armour, and, by means of a step-by-step electrical system similar to that employed for electric clocks, it serves to operate repeater compasses which may be placed in any position in the ship, for steering or for taking bearings, or for gunnery or torpedo purposes. Several types of these repeater compasses are made, all of which are portable. For submarines an especially small type of repeater is used, which weighs only 5 lb. This repeater can be quickly placed on the bridge for navigation on the surface, and as quickly removed when the submarine is to be submerged. The repeater is made with a chest bracket attachment, so that it may be carried from place to place when firing torpedoes.

In the Sperry compass, even though the power supply be deranged or disconnected, the entire system is operative with fair accuracy for a period of two hours. All gyro-compasses have a natural error, depending on the magnitude and relation of three variables—speed, latitude and course. In the Sperry compass all of these corrections are applied automatically by means of an automatic correction device attached to the master compass. The equipment is provided with a further check in the form of an alarm system, which rings a gong when any part of the master compass, or the supply of current, or the 20-volt dynamo fails.

Night-firing in the U.S.

During the last few years the United States Navy has abandoned firing practice in daylight with the anti-torpedo armament, and all small guns carry out night practice only. This arrangement is due to the fact that torpedo attack is certain to be made at night, except in the case of fleet actions, where a disabled ship can be sunk by the torpedoes of light cruisers and destroyers after the remainder of the squadron has, in the course of the fight, been obliged to abandon its lame ducks. Another reason alleged for abandoning day firing is that with modern high velocity guns, firing pointed projectiles of flat trajectory, the hitting of a target at reasonable ranges becomes a comparatively simple matter.

On the other hand night practice calls for much more than the mere loading, laying and firing of a gun. The picking up of a target

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at night, the estimation of the range, with perhaps no other guide than the bow wave of a destroyer, the spotting of the shots, and the necessary corrections for alteration of range in addition to keeping the sights on an almost invisible target, call for an alertness and skill which can only be attained by long practice. Often not more than one minute may elapse between the sighting of a hostile destroyer and the firing of its torpedo, and during this brief period it is necessary so to control the fire of the defending small guns that errors of the earlier shots are corrected even before the preceding shots have struck the water and thus caused a visible splash.

Semple night-tracer.

Therefore in modern navies the projectiles of the anti-torpedo armament guns are provided with a tracer, which allows the path of a projectile to be followed and serious errors to be corrected almost as soon as a shell has left the gun. The tracer in general use was invented by Mr. J. B. Semple, an American, and several years were spent in experimenting and improvements before the United States Navy adopted the device, which consists of a small tube screwed into the base of the shell and filled with a non-explosive mixture, which, when ignited, gives a small but intensely brilliant flame The igniting of the composition does not take place in the gun but as the projectile leaves the muzzle. The Semple night tracer has been adopted by the British Navy and Army, and is now being made in the Royal Arsenal, Woolwich. The principal foreign Powers have also adopted the invention. We are informed that the flight of a shell fitted with a Semple night tracer can be followed by the naked eye throughout a range of 10,000 yards, and also that any projectile out of a salvo can be identified with the gun from which it was fired. When used in firing against airships it is claimed that the Semple tracer serves a double purpose, as it permits of "spotting" in three dimensions, and at the same time a hit on the gas-bag of an airship gives an even chance of igniting the hydrogen. It seems at first glance somewhat strange that such an intense flame may pass through a balloon filled with hydrogen without igniting it, but probably the explanation is that the projectile does not draw in after itself sufficient air to make an inflammable mixture, or that the mixture is formed so far behind the projectile that it is not reached by the tracer flame. At any rate, whatever may be the explanation, the fact remains that only about six out of ten hits with projectiles fitted with tracers can be relied upon to set fire to the balloon.

Day-tracer.

For use in the day-time the Semple Company have a special shell fitted with a container, from which issues in flight a dense black liquid cloud or spray, which enables the aim to be corrected as

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required. The British Admiralty have adopted the Semple day-tracer and Messrs. Vickers have acquired the English manufacturing rights.

Fire-direction and control.

In connection with the subject of direction and control of fire which was fully discussed in last year's *Naval Annual*, a letter from Captain William S. Sims, the late Inspector of Target Practice in the United States Navy, to an American Service paper may be quoted. He says:—

"Generally speaking, the fire-control apparatus in all navies is sufficiently well known. Nearly all the systems are articles of commerce. Such tangible objects cannot long be kept secret. Moreover secrecy in respect of them is of little value at best. The only matters pertaining to battle efficiency of which secrecy is highly important are contained in the heads of our officers—that is, our methods of gunnery training, of controlling gun-fire in action, of the results we are achieving; and these, to the frequently expressed and utter astonishment of foreign officers, are very fully explained in numerous articles that have been, and still are, appearing in the Proceedings of the United States Naval Institute."

ITALY.

In dealing above with the new controversy which has arisen concerning the respective merits of wire-wound and built-up guns reference was made to the proposals that are being discussed in Italy. Considerable delay has occurred in the beginning of the new battleships, and no certainty can be felt as to their actual characteristics, but it is intended to mount in them eight or ten 15-in. guns, and it is understood that two-thirds of these will be wire-wound guns from the Vickers-Terni and Pozzuoli works, while the other third will be of a built-up construction, on the Schneider system, to be produced by the Ansaldo firm at Sampierdarena, Genoa. No doubt considerable commercial interests are involved in these intended arrangements, and a campaign has been conducted in favour of the gun built up of elements of steel of high quality. Captain Ettore Bravetta, who has often discussed ordnance questions has appeared as an advocate of the new class of guns. His arguments are very largely based on the researches of MM. Léon Coupaye and Pierre Malaval on the transverse structure of guns, and the limitations of tangential dilatation, which he has translated from the French, and with comments has recommended to the consideration of the Italian naval authorities. ("La Resistenza delle Artiglierie," Turin, 1913.)

He has been led to doubt whether the theories and formulæ according to which Italian guns have hitherto been constructed are

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exact, and whether they are applicable to the conditions of the present time, in which very high pressures are required. He questions the value of the formulæ of "limit of safety" and "limit of resistance," and remarks of Italian guns hitherto constructed that extraordinary elastic resistance has been attributed to them, superior in some cases to a pressure of 7000 atmospheres; also that they possess a large margin of safety. But, he says, if a gun-tube has a limit of elasticity of 40 kg. per square millimètre, the gun of which it forms part cannot be subjected to a greater internal pressure of more than 4000 kg. per square centimètre without being permanently changed in form. In other words, the superior limit of internal pressure which measures the resistance of the gun is 4000 kg. per square centimètre, and will be much inferior to the 7000 atmospheres attributed to the wire-wound gun. The pressure under which a gun begins to assume a permanent change of form is, he states, less than the limit of elasticity of the metal constituting its internal element.

Formulæ for gun construction.

M. Coupaye asserts that it is not possible to contemplate a higher pressure than is stated in guns as now constructed. He admits, nevertheless, that guns subjected to higher pressures do not necessarily fracture transversely, but this he attributes to the fact that a considerable difference exists in modern steels between the limits of elasticity and of fracture—" ce qui constitue une marge de sécurité précieuse pour la solidité de l'édifice." He says, however, that permanent deformation of the gun will result of a nature to change the relations of its elements among themselves, and that this may influence the behaviour of the projectile in the tube. In any case, he adds, the structure would not remain invariable, and the increase of pressure beyond the standard he sets up would lead to the beginning of permanent changes in the gun, which danger must form a serious consideration in view of the high pressures that are now in use. It is, of course, obvious that these arguments would apply equally well to a gun of any system of construction, but they are adduced with the object of showing that wire-wound guns do not possess all the high merits that are attributed to them.

Pressure in guns.

The French engineer, M. Coupaye, upon whose investigations the Italian arguments are chiefly based, has treated the problem of gun construction in the light of elastic deformations of the straight cylinder, and has limited himself to the calculations for a gun whose deformations should always be elastic and never permanent.

The fact that radial deformation might become greater than tangential deformation was shown by Kaiser, and M. Coupaye has brought evidence in favour of his contention against the building of

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guns having purely elastic deformation of a power superior to the limit of elasticity of the metal of which the internal tube is made. He says that the power effectively and practically realisable is about equal to nine-tenths of this elastic limit. This is true whatever system of manufacture be adopted, both with regard to built-up and wire-wound guns. Captain Bravetta, however, argues on the basis of this calculation in support of his plea for the abandonment of wire-wound guns, in view of the considerable disadvantages which, he believes, are inherent to such weapons. The laws of elasticity are held to have proved that the elastic resistance of a gun is limited, for, if the metal of the internal tube possess, for example, the limit of elasticity of 40 kilos., a piece of ordnance of normal thickness will become deformed in a permanent manner under an internal pressure of 3600 kilos. or more per square centimètre.

Calculations of ordnance on the basis of radial deformation are useful, and perhaps necessary, where it is required to use relatively high pressures, and Captain Bravetta has based some of his views on the investigations of Lieut.-Colonel Bianchi, of the Italian artillery, who has sought the formulæ necessary for such calculations, showing that they are not more complicated than those now in use based on tangential dilatations.

Deformation of guns.

M. Malaval has also essayed to show that the present pieces possess an elastic resistance not greater than nine-tenths of the limit of elasticity of the metal forming the internal tube; but he claims the possibility of constructing guns capable of supporting the enormous pressure of 10,000 kilos per square centimètre, without any deformations resulting when the piece returns to a state of repose. He has brought these facts into evidence during the course of his investigations of the deformation of the tube beyond the elastic limit of the metal of which it is constructed; and he has shown that a plain tube, when it becomes deformed, assumes of its own accord a new state of elastic equilibrium which will remain invariable until the internal pressure (to which the tube may afterwards be submitted) exceeds the maximum of deformation. It is argued that the new method, which leads to the consideration of the utilisation of practical or accidental pressures greatly superior to those now in use, will also permit economy in the cost of workmanship, since guns, remaining of the same thickness as before, may be built up of a lesser number of elements. The theories and suggestions are interesting, if not conclusive, and they show the tendencies at work in foreign ordnance circles.

Concerning the armour of the intended new ships very little can be said. There is a strong desire that it shall be of Italian manufacture,

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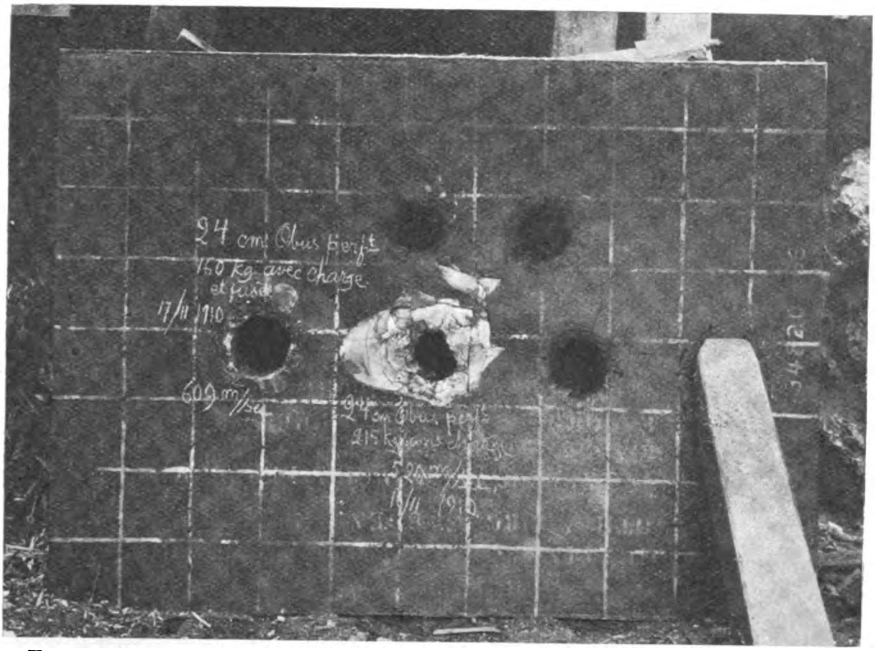

FIG. 1.—9·6-IN. K.C. PLATE ATTACKED BY BOFORS BASE FUSE 9·6 IN. A.P. SHELL.

160 kg. weight, bursting charge = 3 per cent.; fuse, Bofors base fuse with retarded action; striking velocity, 1998 ft.-secs.

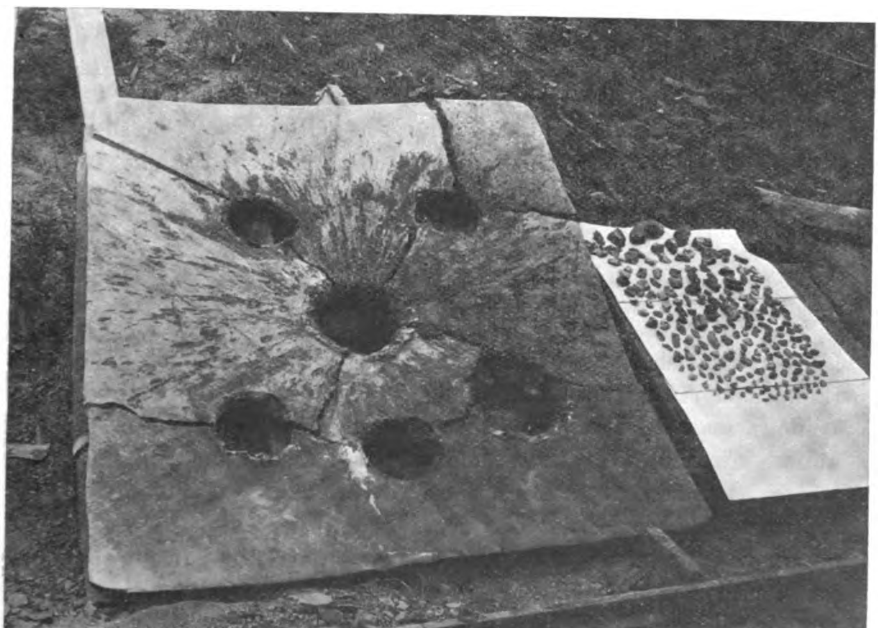

FIG. 2.—4·7-IN. NON-CEMENTED PLATE ATTACKED BY 9·6-IN. SEMI-A.P. SHELL.

Plate and fragments recovered. The shell was fired with Bofors reduced retarding action fuse.

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and the splendid establishments of the Società di Terni and of the Ansaldo Company at Cornigliano Ligure (with its 10,000, 6000 and 2000-ton presses), are eager for the work, some of which is doubtless in hand. At the last meeting of the naval architects at Spezia a question was raised as to the right thickness of armour to be used for the new battleships. The Acciaierie di Terni have produced Krupp plates of 30 cm. (11·81 in.) and 34 cm. (13·39 in.), and five of the former and two of the latter gave brilliant results in official tests at the Castagna proving ground last July. But at Spezia Signor Giuseppe Orlando, director of the Terni Armour and Vickers-Terni Ordnance Works, expressed the view that it would be unwise for the Italian Navy to employ thicker plates than 30 cm. or 32 cm. (11·81 and 12·6 in.). He said that the long range, rolling of the ships, angle of hits and other circumstances made experiments of the trial ground no sure guide to the results that would be attained in action. In view of the increased displacements that would result from employing 15¾ in. armour, and the requirements of speed and other advantages, he counselled the Italian authorities not to exceed the thickness of plating he recommended. Vice-Admiral Viotti, assuming from Signor Orlando's remarks that the national industry could not produce the thicker plating without great difficulty and expense, has deplored that the new ships were to have protection which in his view is insufficient. The truth appears to be that the Italian authorities have not, unless quite recently, arrived at any decision on the subject. Armour of 15 or 16 in. would inevitably cost more than thinner armour, and if professional opinion favours the latter it will probably be adopted. In the United States and Japan very thick armour is used, but in the British Navy we have not so far greatly exceeded the maximum thickness of plating which can be produced in Italy.

SWEDEN.

The Swedish Navy is a small but progressive force, and under the impulse of strong national feeling the defences of the country are being increased. Everything that concerns them is making progress, and we are able to illustrate some very interesting armour-plate trials which have recently taken place. The Bofors Co. produces the ordnance and projectiles for the Navy with great success. Very extensive experiments have been carried on at Bofors during several years with a view of elaborating suitable base percussion fuses for armour-piercing shells loaded with trinitrotoluole, and have led to very satisfactory results. Fig. 1, page 367, represents a 9·6-in. K.C.

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plate fired at with a 9·6-in. A.P. shell weighing $357\frac{3}{4}$ lb. The weight of the bursting charge was equal to 3 per cent., and the shell was fused by the Bofors base fuse with retarded action. The striking velocity was equal to 1998 f.s. As is shown by the photograph, the shell pierced a clean hole in the plate, the detonation taking place behind the plate, where the wooden backing was completely wrecked.

Fig. 2 shows the effect of the detonation of a 9·6-in. semi-A.P. shell weighing 434 lb. and carrying a 41·2-lb. trotyl bursting-charge, when fired against a 4·7-in. non-cemented plate, with a striking velocity of 1312 f.s. The base fuses used with semi-A.P. shells have a somewhat less retarding action, in order to avoid the breaking up of the shell before the explosion occurs in case of hitting a resistant object. Hence the detonation took place while the rear end of the shell was still passing through the plate. The photograph shows the appearance of the plate after the round, with fragments of the shell recovered. As will be seen, the plate was broken into pieces. In laying these together, the hole from the shell showed an augmentation of the diameter from 9·6 in. to 12·2 in.

The effect of firing at an oblique angle of 30 deg. a 3-in. loaded shell at a 3-in. armour plate, with 1640 f.s. striking velocity, was to form a rough shallow spall on the surface of the plate, without any cracking. The fuse was non-retarded, acting immediately after the impact of the shell, and causing complete detonation.

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BRITISH RIFLED ORDNANCE.

Other guns are mounted, but details are withheld from publication.

Ordnance.										Charge (cordite).		Projectile.						Ballistics (with full charges).					
Nature.					Chamber.		Rifling. Twist one turn in.												Perforation of wrought iron.				
Calibre or Pr.	Weight.	Mark and Service.*	Total length in inches.	Length of Bore, including Chamber.	Diameter (at largest).	Length to base of projectile.	Least at breech.	Greatest at muzzle.	System.†	Weight.	Size.	Diameter.	Weight.	Bursting Charge of Common Shell.	Value of $\frac{d^2}{w}$.	Value of $\frac{w}{d^3}$.	Muzzle velocity.	Total muzzle energy.	At muzzle.	At 1000 yards range.	At 2000 yards range.	At 3000 yards.	Perforation Krupp steel, 3000 yards. Uncapped Shot.
B.L. GUNS.				cals.	ins.	ins.	cals.	cals.		lbs. oz.		ins.	lbs.	lbs. oz.			f. s.	ft. tons.	ins.	ins.	ins.	ins.	ins.
16·25-in.	110½ tons.	III.	524·0	30·0	21·125	84·5	newer patterns.	30	Modified Pl. Section, the last in the new guns.	960‡ S.B.C.	..	16·25	1800	‡‡193 / **179¼	0·147	0·420	2087	54,390	38·0	34·6	31·7	29·4	13
13·5-in.	69 & 67 tons.	I. II. III.& IV.	433·0	30·0	18·0	66·5		30		187 8	..	13·5	1250	**85	0·146	0·508	2016	35,230	33·0	30·2	27·6	25·2	11
12-in.	46 tons.	VIII. Wire	445·5	35·43	16·0	70·0		30		167 8	50	12·0	850	80–1 9/11	0·169	0·492	2367	33,020	37·0	32·7	29·4	26·6	11½
12-in.	50 tons.	IX. Wire	496·5	40·0	17·5	87·2		..		201 8 / 9 8	50 / 3¾	12·0	850	"	..	..	2481 / §2580	36,290 / 39,280	39·7 / 42·0	35·4 / 38·0	31·6 / 34·6	28·7 / 32·0	12½ / 14
12-in.	58 tons.	X. Wire	558·0	45·0	..	..		..		325 0 M.D.	..	12·0	850	..	..	..	2900	47,697	51·0	46·2	42·0	38·4	17
10-in.	31 tons.	Triumph & Swiftsure	483·0	45·0	14·0	64·5		..		..	..	10·0	500	..	..	..	§2800	§27,205	39·5	34·6	30·2	27·0	11¾
10-in.	29 tons.	II. III. III.ᴬ & IV.	342·4	32·0	14·0	54·0		30		76 0	30	10·0	500	37¾	0·200	0·500	2040	14,430	24·8	21·8	19·3	17·0	7½
9·2-in.	21 & 22 tons.	I. & II.	255·8	25·56	11·0	44·0		35		42 0	30	9·2	380	18 ‡‡33 **30 6/16	0·223	0·488	1781	8,356	18·3	15·9	14·4	12·4	5½
9·2-in.	24 & 22 tons.	III. V. VI. VI.ᴬ & VII.	310·0	31·5	12·0	43·0		30		53 8	30	9·2	380		0·223	0·488	2065	10,910	22·9	19·8	17·2	15·5	6¾
9·2-in.	25 tons.	Wire VIII.	384·0	40·08	10·5	53·15		..		63 0	40	9·2	380	..	0·223	0·488	2347	14,520	27·6	23·9	20·7	18·0	7¾

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9·2-in ††	28 tons.	Wire X.	442·35	46·6	13·0	71·215	Various in the	..	P. Elswick, Hook, or	103	0	44	9·2	380	..	0·223	0·488	2640 §2800	18,400 20,685	33·3 36·0	28·9 31·2	25·0 27·4	22·0 24·0	9½ 10½
7·5-in.	16 tons.	Triumph & Swiftsure	386·7	50·0	..	46		..		..		..	..	200	..	0·281	0·474	§2800	10,883	29·0	24·9	21·4	17·8	7¾
7·5-in.	14 tons.	..	337·5	45	11·1	55		30		47 2	0 8	30 2½	7·5	200	18½	0·281	0·474	2600	9,340	26·0	22·3	18·8	15·7	6¾
6-in.	5 tons.	III.	170·7	25·53	8·0	26·75		35					6·0											
6-in.	5 tons.	IV. VI.	173·5	26·0	8·0	26·75		35 30		14	12	20	6·0	100	$7\frac{4}{16}$ **$9\frac{13}{16}$	0·360	0·463	1960	2,665	13·4	10·7	8·9	7·0	3
6-in.	7·4 tons.	VII. VIII.	269·5	45	8·5	32·7		30		20	0	20	6·0	100	9	0·360	0·463	2493 §2750	4,308 5,250	19·6 22·3	15·3 18·0	11·9 14·6	9·8 11·6	4¼ 5
4-in.	23 cwt. 26 cwt.	II.II, III.III, IV.V.& VI.	120·0	27·0	5·3	18·5	120	30		3	1	5	4·0	25	$11\frac{12}{16}$ $8\frac{3}{16}$	0·640	0·391	1900	625	7·7	5·4	4·0	3·0	..

* The Roman numeral is the number of the pattern given. Further differences in pattern are indicated by letters a, b, and c. Some details of the 12-in. Mark X. uncertain

† P. means Polygroove; Pl., Plain; ‡ Cordite has not been introduced for this gun; § Estimated with M.D. cordite;

** Cast steel; †† A 50-calibre 9·2-in. gun is under construction; ‡‡ Forged steel.

BRITISH RIFLED ORDNANCE.—*continued.*

Ordnance. Nature. Calibre or Pr.	Ordnance. Nature. Weight.	Ordnance. Nature. Mark and Service.	Ordnance. Total length in inches.	Ordnance. Length of Bore, including Chamber.	Ordnance. Chamber. Diameter.	Ordnance. Chamber. Length to base of projectile.	Ordnance. Rifling. Twist one turn in Least at breech.	Ordnance. Rifling. Twist one turn in Greatest at muzzle.	Ordnance. Rifling. System.*	Charge (full). Weight.	Charge (cordite). Weight.	Charge (cordite). Size.	Projectile. Diameter.	Projectile. Weight.	Projectile. Bursting Charge of Common Shell.	Projectile. Value of $\frac{d^2}{w}$.	Projectile. Value of $\frac{w}{d^3}$.	Muzzle velocity.	Ballistics (with full charges). Total muzzle energy.	Ballistics. Muzzle energy per ton of gun.	Ballistics. Perforation of wrought iron. At muzzle.	Perforation. At 1000 yards range.	Perforation. At 2000 yards range.	Perforation. At 3000 yards range.
				cals.	ins.	ins.	cals.	cals.		lbs.	lbs. ozs.		ins.	lbs.	lbs.			f. s.	ft. tons.	ft. tons.	ins.	ins.	ins.	ins.
QUICK-FIRING GUNS (using metal cases)																								
6·0 in	7 tons	I. & III. II. (Wire)	249·25	40	..	..	60	30	P.	..	13 4	30	6·0	100·0	..	0·360	0·463	2200	3356	479	15·9	12·7	10·2	8·2
6·0 in Q.F.C.	5 „	I. to VI.	169·1 166·6	26·2 26·6	.. ..	.. ..	.. ..	.. ..										1913	2537	362	13·0	10·3	8·2	6·4
4·7 in.	41 cwt. 42 „	I. II. III. & IV. Wire	194·1	40	..	..	100 0	34·4 30	E.O.C.	..	5 7	20	4·72	45·0	..	0·495	0·428	2188	1494	711	12·4	9 2	6·6	5·0
4 in.	26 cwt.	I. II. III. Wire converted guns	165·25 120	40 28	..	..	..	30	M.Pl.	..	3 9	15	..	25·0	..	0·640	0·390	2300 2177	917 821	705 569	10·5 9·5	6·9 6·5	4·9 4·6	3·3 3·0
12-pr.	12 cwt.	I.	123·6	40	..	..	120 0	28 30	E.O.C. M.Pl.	..	1 15	10	3·0	12·5	..	0·072	0·463	2210	423	677	8·1	5·3	3·5	2·4
12-pr.	8 cwt.	I.	87·6	28	..	..	60 0	28 30	E.O.C. M.Pl.	..	13¾	10	3·0	12·5	..	0·072	0·463	1607	223·8	544	4·9	3·2	2·4	..
Hotchkiss . 6-pr...	8 cwt	I. & II.	97·63	40·0	..	..	180	29·9	M.Pl.	..	b7¾	5	2·24	6·0	..	0·836	0·534	1818	137·5	344·8	4·8	2·8	..	..
Nordenfelt . 6-pr...	6 cwt.	I. II. & III.	104·4	42·3	..	..																		
Hotchkiss . 3-pr ..	5 cwt.	I. & II.	80·63	40	..	..	25	25	M.Pl.	..	b6⅜	5	1·85	3·3	..	1·037	0·521	1873	80·3	321 2	4·1	2·1	..	..
Nordenfelt . 3-pr...	4 cwt.	I. L.	91·5	45·4									..	..	..	..	..	1920	84·3	337·2	4·3	2·2	..	..
MACHINE GUNS.										grains.				grs.										
Maxim, 1 bar 0 45 in.	63 lbs.	I.	45·0	..	..	..	10	27	Enf'ld	31 Cordite	..	..	0·450	480	..	2·952	0·751	..	..	..	Same as M.H. Rifle.			
Maxim, ·303 . .			42·38				10	25·6	Metf'd				0·303	215	..	..	..	..	..	..	Same as Lee-Metford.			

* P. means Polygroove; M.Pl., Modified plain.

b With 4 grs. R.F.G.

Note.—An armour-piercing shell has now come in for the 6-in. guns.

AUSTRIAN NAVAL ORDNANCE.

Designation by Calibre, in centimètres, length in calibres, and type of gun		38 L. 45 Skoda.	35·5 L. 45 Skoda.	30·5 L. 45 Skoda.	24 L. 45 Skoda.	24 L. 40 Skoda.	24 L. 40 K. 97	24 L. 40 K. 94	15 L. 40 Skoda.	15 L. 40 Krupp	15 L. 35	12 L. 40 Skoda.
Calibre, in inches		14·96	14	12·01	9·45	9·45	9·45	9·45	5·91	5·9	5·87	4·72
Length	Total, in feet	59	52	45·0	35·5	31·5	31·5	31·5	19·5	19·5	17·13	15·74
Length	Rifled Portion, in ins.	..	..	417·9	325·8	290·3	290·3	286·2	182·6	182·5	153·6	147·6
Length	Powder Chamber in ins.	..	..	78·3	65·2	55·5	55·5	63·7	35·4	35·4	35·4	28·6
Length	Of bore in calibres	..	..	45	45	40	40	40	40	40	35	40
No. of Grooves		..	..	92	72	72	72	72	44	44	44	36
Twist in calibres		..	..	40–25	40–25	45–25	45–25	∝–25	∝–25	∝–25	45–25	45–25
Weight	Gun, tons	79·3	69	51–9	26·23	27·30	29·8	27·5	4·22	4·36	3·68	2·04
Weight	Breech Block, in lb.			3450·2	1873·9	1336·0	...	1450	330	339·5	346	172
Weight	Steel Shell „	1907	1565·3	992	473·0	504·8	473	473	102·1	102·1	102·1	52·4
Weight	Common Shell „	1477	1212·5	992	473·0	504·8	473	473	112·5	..	102·1	52·4
Weight	Shrapnel Shell „	..	..	..	..	..	..	..	..	..	102·1	52·4
Weight of Bursting Charge	Steel Shell „	..	..	7·3	2·03	8·3	8·3	8·3	3·31	3·31	1·98	1·1
Weight of Bursting Charge	Common Shell „	..	..	53·6	23·4	29·5	29·5	47·3	4·84	4·84	5·73	2·86
Weight of Bursting Charge	Shrapnel Shell „	..	..	..	..	..	..	..	1·00	1·00	1·00	0·53
Weight of Firing Charge	Steel Projectile, in lb.	586	474	304	156·2	99·2	99·1	91·5	18·29	18·29	17·82	9·7
Weight of Firing Charge	Common Shell, in lb.	586	474	304	..	99·2		91·5		18·29	17·82	9·7
Weight of Firing Charge	Shrapnel, in lb.	..	..	..	..	..	..	..	11·85	11·85	11·85	4·41
Muzzle Velocity, in feet		2979	2979	2625	2625	2313	2313	2264	2264	2264	2133	2264
Muzzle Energy	Total, foot-tons	91103	69976	..	..	..	..	..	..	..	..	..
Muzzle Energy	Per inch circumference, foot-tons	..	..	..	..	..	..	..	..	..	..	..
Thickness of Iron, perforated inches at Muzzle, by Tresidder's formula		46·2	43·7	..	..	..	..	..	..	..	..	..
Perforation of Krupp Steel, 3000 yds., inches		..	..	..	..	..	..	..	..	..	..	..

There are also Skoda 9·3-in. and 2·75-in. and Skoda and Hotchkiss 3-pdrs.

Corrected to April, 1914.

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DANISH NAVAL ORDNANCE.

Designation by Calibre, in centimètres, length in calibres, and type of gun	26 L. 35 Krupp	24 L. 40 1893 Krupp.	24 L. 40 1896 Canet.	24 L. 43 1901 Bofors.	24 L. 43 1906 Bofors.	21 L. 35 Krupp.	15 L. 35 1888 Krupp.	15 L. 43 1896 Bofors.	15 L. 43 1901 Bofors.	15 L. 50 Bofors.	12 L. 40 Krupp.	8·7 L. 40 Krupp.	7·5 L. 55 Danish semi-aut	5·7 L. 44 Hotch-kiss.	4·7 L. 44. Hotch-kiss.	4·7 L. 50 Danish semi-aut.
Calibre, in inches	10·24	9·45	9·45	9·45	9·45	8·24	5·87	5·87	5·87	5·87	4·72	3·43	2·95	2·24	1·85	1·85
Total length, in feet	29·86	31·50	31·50	33·86	33·86	24·05	17·12	21·17	21·17	24·46	15·75	11·41	13·53	8·13	6·72	7·71
Length of Bore, including Powder Chamber, in inches	327·6	349·7	358·5	397·0	397·0	264·5	189·0	244·0	247·4	286·4	176·4	126·8	152·6	89·8	74·1	87·6
Length of Bore, including Powder Chamber, in calibres	32·0	37·0	37·9	42·0	42·0	32·1	32·2	41·6	42·1	48·8	37·3	37·0	51·7	40·0	40·0	47·3
Number of Grooves	60	72	60	60	60	48	36	44	44	44	36	32	28	24	20	20
Twist of Rifling, in calibres	70–25	00–25	72–33	72–33	33	50–25	70–25	70–30	70–30	30	42–25	45–20	30	180–30	25	40–25
Total weight, including Breech-gear, tons	27·3	25·4	22·9	24·3	24·5	13·3	4·7	5·5	5·5	7·5	2·26	1·13	0·87	0·36	0·23	0·32
Weight of Breech Block, lb.	2006	1691	871	851	802	904	390	295	252	313	205	136	83	60	40	40
Weight of Armour-piercing Projectile, lb.	452	353	353	353	353	238	112	112	112	112	..	..	..	..	..	..
Weight of " Shell "	..	353	353	353	353	..	..	112	112	112	44	20	15	6	3·3	3·3
Weight of Common Shell, lb.	452	353	353	353	353	238	112	112	112	112	44	20	15	6	3·3	3·3
Weight of Bursting Charge, Armour-piercing Shell, lb.	..	5·3	5·3	5·3	5·3	..	..	1·7	1·7	1·7	1·7	0·7	0·7	0·25	0·11	0·11
Weight of Bursting Charge, Common Shell, lb.	29·8	24·9	24·9	21·4	21·4	16·5	7·2	7·2	7·2	7·2	2·8	1·3	0·7	0·19	0·14	0·14
Weight of Firing Charge, lb.	191·8	91·5	77·2	83·8	97·0	105·8	41·9	22·0	22·5	34·2	11·3	4·7	4·0	1·3	1·1	1·4
Muzzle Velocity, feet	2018	2362	2362	2477	2641	2018	1854	2297	2297	2690	2362	2362	2625	2297	2346	2723
Muzzle Energy, Total foot-tons	12750	13640	13640	15000	17060	6712	2678	4100	4100	5642	1702	767	737	218	126	170
Muzzle Energy, Per inch circumference, foot-tons	396·4	459·5	459·5	505·4	574·7	259·3	145·2	222·4	222·4	306 1	114·8	71·2	79·5	31·0	21·7	29·3
Perforation at Muzzle, wrought iron, Tresidder's formula, inches	22·8	26·6	26·6	28·6	31·5	18·5	13·2	18·3	18·3	23·2	13·3	10·5	11·7	6·8	5·8	7·2
Perforation Krupp Steel, 3000 yards, inches	6·2	9·1	9·1	9·8	10·7	4·2	3·3	6·2	6·2	7·9	..	..	..	..	..	..

There are also some older 1·46-in. 1-pdr. Hotchkiss guns. Corrected to April, 1914. *See* also Bofors Tables.

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DUTCH NAVAL ORDNANCE.

	Krupp Q.F.								
Designation by Calibre, in centimètres	28 Q.F.	24 Q.F.	24 Q.F.	15 Q.F.	15 Q.F.	15 Q.F.	12 Q.F.	10·5 Q.F.	7·5 Q.F.
Calibre, in inches	11·0	9·4	9·4	5·9	5·9	5·9	4·72	4·1	3·0
Total Length, in feet	40·0	31·5	31·5	19·55	19·55	19·55	15·75	18·5	13·5
Length of Rifled Portion of Bore, in inches	..	..	..	..	..	..	..	..	..
Length of Powder Chamber „	..	..	..	..	..	..	..	..	..
Length of Bore, in Calibres	40	37	37	37	37	37	37	50	55
Number of Grooves	..	..	..	..	..	..	..	..	..
Depth of Grooves, inches	..	..	..	..	..	..	..	..	..
Twist of Rifling, in Calibres	..	..	..	..	..	..	..	..	..
Total Weight, in tons	31·0	24·5	24·5	4·83	4·88	5·11	2·40	1·24	1·00
Firing Charge { Armour-piercing Projectile, in lb. / Common Shell „	..	..	..	..	..	..	..	..	..
Weight { Armour-piercing Projectile „ / Common Shell „ / Case Shot „	595·24	374·80	374·80	100	90·38	90·38	52·35	39·68	12·90
Bursting Charge { Armour-piercing Projectile „ / Common Shell „	..	..	..	..	..	..	..	..	..
Muzzle Velocity, feet	2920	2690·5	2789	2221	2444	2789	2221	2900	2945
Muzzle Energy { Total, in foot-tons	15,191	18,809	20,210	3469	3744	4874	1807	..	..
Muzzle Energy { Per inch Circumference, foot-tons	..	..	..	..	.	..	..	..	..
Perforation at Muzzle, in inches (Krupp Steel)	24·25	18·1	19·1	6·5	9·8	11·5	4·7	..	..
Perforation Krupp Steel, 3000 yards	18·50	14	14·2	3·9	5·7	7·1	..	..	..
Model	1909	1900	1905	1899	1900	1905	1899	1912	1910

Corrected to April, 1914. There is a new model of the 28 cm. with muzzle energy of 35,000 ft. tons.

FRENCH NAVAL ORDNANCE.*

Date and Pattern of Gun	Model 1902.	Model 1893–96.				Model 1893.					Model 1887.				1884.				
Desig. by Calibre, in cms.	30·5	30·5	27·44	24·0	19·4	34·0	30·5	27·44	24·0	19·4	34	30·5	27	19	34	27	24	16	14
Calibre, in inches	12·01	12·01	10·8	9·45	7·64	13·39	12·0	10·8	9·45	7·64	13·39	12·0	10·80	7·64	13·39	10·80	9·45	6·49	5·45
Total length, in feet	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	28·47	24·89	17·04	..
Length of Bore, in ins.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Length of Bore, in cals.	45	40	40	45	45	35	40	40	40	40	42	45	45	45	30	30	30	30	30
Number of Grooves	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Depth of Grooves, inches	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Rifling Twist	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total weight, in tons	..	44·4	34·5	23·6	12·5	52·9	45·9	34·9	22·4	10·6	60·0	49·2	37·1	10·6	50·8	27·7	17·9	5·4	3·15
Weight of Firing Charge: Armour-piercing Projectile. lb.	..	246	188·5	145½	74	243·0	198·4	114·6	110·2	44·1	220·5	198·4	114·6	44·1	388·0	200·6	..	42·5	..
Weight of Firing Charge: Common Shell "	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	200·6	..	42·5	27·1
Weight: Armour-piercing Projectile. lb.	750	750	562	375	190	925·9	643·8	476·2	317·5	165·3	925·9	643·8	476·2	165·3	925·9	476·2	317·5	99·2	..
Weight: Common Shell "	..	750	562	375	190	925·9	643·8	476·2	317·5	165·3	925·9	643·8	476·2	165·3	771·6	396·8	264·6	99·2	66·1
Muzzle Velocity, in f.-s., A.P. Projectile	2870	2650	2650	2870	2870	2400	2625	2625	2625	2625	2560	2625	2625	2625	1969	1969	1969	1969	1969
Muzzle Energy: Total, in f.-t.	42890	36782	27186	21445	10890	36850	30750	22750	15170	7898	42040	30750	22750	7898	24900	12800	8539	2668	1777
Muzzle Energy: Per in. circ., f.-t.	..	..	..	..	..	..	815·8	670·7	511·1	329·1	..	815·8	670·7	329·1	591·9	377·5	287·7	130·8	108·9
Perforation at Muzzle,† wrought iron, inches	46·0	42·7	38·8	37·0	29·0	36·8	37·3	33·7	29·4	23·4	40·8	37·3	33·7	23·4	27·6	22·0	19·2	13·0	10·7
Perforation Krupp Steel, 3000 yds.	15½	13½	11½	10½	6¾	11½	11	9	7½	5½	13	11	9	5½	7½	6	5¼	3	..

* Official particulars are unattainable, 1914. The **13·4-in. 45-calibre gun** of the Normandie and Bretagne classes weighs 66 tons, and the projectile 1190 lb. The muzzle energy is 65,340 foot-tons, and the **penetration at 9000 mètres (9842 yds.)** is 11·8 in. of **Krupp** steel. The bursting charge is said to be 55 lb. of melinite.

† **By Tresidder's formula.**

FRENCH NAVAL ORDNANCE—*continued.*

Date and Pattern of Gun.	Q.F. Guns. Mod. 93-6. 16·47	16§	16‡	14§	14‡	Mod. 92. 10	Mod. 91. 10	Mod. 81. 10‡
Desig. by Calibre, in cms.		16·47		13·86			10·00	
Calibre, in inches		6·46		5·44			3·94	
Total length, in feet								
Length of Bore, in inches								
Length of Bore, in calibres	45	45	30	45	30	55	45	26
Number of Grooves								
Depth of Grooves, inches								
Rifling Twist								
Total weight, in tons	8·1	6·89	4·92	4·13	3·84	2·19	1·62	1·18
Weight of Firing Charge: Armour-piercing Projectile, lb.	44	30·2	19·0	16·1	12·8	8·16	8·16	5·07
Weight of Firing Charge: Common Shell, ,,								
Weight: Armour-piercing Projectile, lb.	115	99·21		66·14			30·87	
Weight: Common Shell, ,,	115	99·21		66·14			30·87	
Muzzle Velocity, in ft.-secs.	2870	§2625	2100	2625	2100	2500	2428	1840
Muzzle Energy: Total, in foot-tons	6568	4730	3061	3160	2022	1340	1266	725
Muzzle Energy: Per in. circ. foot-tons	..	233·5	150·9	184·9	118·7	..	..	..
Perforation at Muzzle, wrought iron, inches	24·5†	20·0†	14·4†	17·7†	12·7†	13·0†	12·5†	8·2†
Perforation Krupp steel, 3000 yards	5¼	4	..	..	..	..	..	..

† By Tresidder's formula. ‡ Models 1881 and 1884 converted guns.

§ There are three models of the years 1887, 1891 and 1893, of slightly different weights from the above.

ITALIAN NAVAL ORDNANCE.

		Vickers.	Vickers.	Armstrong.			Q.F.	Armstrong	Armstrong Quick-Firing.			
Designation by Calibre, in centimètres		38·1	30·5	34·3	30·5	25·4	20·3	15·2	15·2	15·2	12·0	7·6
Calibre, in inches		15	12	13·5	12	10	8	6	6	6	4·7	3·0
Length	Total, in feet	58	46·4	36·09	41·5	34·8	31	16·9	20·9	20·9	16·2	10·26
	Rifled Bore, in inches	675	540	409·4	479·9	400	360	194	239·6	239·6	189	119·6
	Powder Chamber, in inches	..	..	67·2	92·1	55·1	47·4	37·7	37·7	37·7	15·9	15·8
	Bore, in Calibres	..	..	30	40	40	45	32	40	40	40	40
No. of Grooves		..	..	56	48	42	32	28	28	28	22	16
Twist of Rifling, in Calibres		..	..	35	30	30	30	30	30	30	34·4	30
Total Weight, in tons		97	58	67·9	51·77	30	19·09	5·4	5·7	6·5	2·05	0·6
Firing Charge	Armour-piercing projectile lb.	..	..	630·5	235·6	231	58·9	46	46	17·6*	5·7	2·2
	Common Shell „	..	..	313	117·7	116·5	29·32	33·7	15·3	6·5	1·85	1·1
Weight	Armour-piercing projectile „	1900	850	1250	850	448	250	98	100	100	45·0	12
	Common Shell „	..	..	1250	880·6	456·3	256·2	102·3	102·3	102·3	44·9	13·9
	Shrapnel „ „	..	..	1250	..	405·6	..	104·7	104·7	104·7	44·9	..
	Case Shot „	..	..	1217	887·6	449·7	256·2	99·6	99·6	99·6	44·9	13·9
Bursting Charge	Armour-piercing projectile „	..	..	17·4	10·7	7·1	2·23	2·0	5·1	4·4	..	..
	Common Shell „	..	..	31	56	19·8	7·5	5·0	5·0	5·0	·88	·66
	Shrapnel „ „	..	..	4·25	..	1·5	..	·66	·66	·66	·24	..
Muzzle Velocity, in ft.-secs.		2500	2850	2016	2500	2460	2600	1952	2149	2297	2180	2625
Muzzle Energy	Total, foot-tons	82,340	47,875	35,230	36,925	18,798	11,730	2577	3169	3622	1490	573
	Per inch circumference, foot-tons	..	..	830·8	..	..	..	..	..	..	..	..
Perforation at Muzzle, inches of iron by Tresidder's formula		56	48·3	33·0	40·0	31·0	28·3	13·2	15·4	17·0	12·4	10·2
Perforation Krupp Steel, 3000 yds., inches		..	..	11	13	9	7	..	..	3½	..	..

* Ballistite.

Note.—There is also a 6-in. quick-firing gun, 40 cals. M.V., 2600 f.s.
The weight of ballistite charges is not known, but it is understood that they give the same ballistics as the powder charges shown.

Corrected to April, 1914.

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NAVAL ORDNANCE OF NORWAY.

	Modern Guns.							
Designation by Calibre, in cms.	21	21 Q.F.	15	15 Q.F.	12 Q.F.	76 mm.	76 mm.	7 cm.
Calibre, inches	8·24	8·24	5·87	5·87	4·7	3·0	3·0	2·8
Total Length, feet	24·0	31·2	19·6	23·3	17·7	10·3	13·3	9·2
Length: Rifled Portion of Bore, inches	212·3	309·7	178·0	234·1	179·2	102·4	127·7	81·8
Length: Chamber, inches	49·0	48·6	39·0	32·9	26·0	15·4	20·4	19·1
Length: Bore in calibres	35·0	43·8	37·2	45·8	44·0	40	50	36·6
Number of Grooves	64	32	44	28	26	16	28	28
Twist of Rifling	46–23	∝–30	45–25	∝–30	∝–30	∝–30	30	20
Total Weight, tons	14·2	18·9	5·6	7·1	2·7	0·6	1·0	0·63
Weight of: Armour-piercing Shell, in lb.	309	309	112·4	99·3	45	12·5	12·5	10·5
Weight of: Common Shell, in lb.	..	..	..	..	..	..	..	..
Weight of* Firing Charge: Armour-piercing Shell, in lb.	45·6	54	20·4	20·9	9·4	2·2	3·75	2·2
Weight of* Firing Charge: Common Shell, in lb.	..	..	..	..	..	..	..	..
Muzzle Velocity, feet	1903	2300	2050	2625	2570	2200	2840	2230
Muzzle Energy, Total foot-tons	7760	11450	3328	4870	2060	430	695	367
Perforation through Iron by Tresidder's formula	19·3	25·6	15·4	21	15·3	8·0	11·6	7·8
Perforation, Krupp Steel, 3000 yards	4¾	6½	3¼	4	..	..	..	..

* Smokeless powder.

Corrected to April, 1914.

RUSSIAN NAVAL ORDNANCE.

		Heavy Guns.			Q F. Guns.		
Calibre, in inches		12	10	8	6	4·7	12-pdr.
Weight, in tons		43	22	12	5½	3	0·9
Length, in calibres		40	45	45	45	45	50
Weight of Projectile, in lb.		730	450	192	91	46	12
Muzzle Velocity, foot-seconds		2600	2275	2950	2600	2700	2700
Perforation, in inches, of Wrought Iron	At Muzzle	38	35	27	22½	15½	10·2
	At 2000 yards	30	27	20	13	9	4·8
Perforation of Krupp Steel at 3000 yards		16	12	8½	3¾	3	..

There exists a new pattern 14-in. 45-calibre gun for the Borodino class (Vickers pattern) and a 12-in. gun of 50 calibres with 714-lb. projectile, 3000 ft. muzzle velocity, and penetration of Krupp steel at 3000 yds. of 20 in., also 10-in. gun of 50 calibres, 8-in. gun of 50 calibres, and 4 7-in. gun of 50 calibres (Vickers).

Corrected to April, 1914.

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SPANISH NAVAL ORDNANCE.

—	Hontoria.—Pattern 83.—Breech Loading.						Canet.		Skoda.			Krupp	Vickers.		Maxim Nordenfelt.	Nordenfelt.		Sarmiento (*)	Hotchkiss.			Maxim Nordenfelt.
Designation by Calibre, in m/m	320	280	240	200	140	120	150	140	150	70	47	105	101·6	75	75	57	42	42	57	37	37	37
Length: Total length, in m/m	11780	10310	10200	7360	5303	4420	7500	6300	5960	2743	2048	3680	5240	1222·9	3500	2651	1935	1946	2480	842	1134	1105
Length: Powder Chamber, in m/m	2113·5	1845	1698·3	1695	1030	836	1124	1078·5	915	..	397·05	750	635·23	111	632·20	345·78	353	525·6	256	129	627	394·6
Length: Bore, in m/m	11180	9787	8387	7095	4879	4173	7250	4893·2	5540	2550	1881	3375	5100	934·74	3200	2413	1750	1806	2280	713	740	980·9
No. of Grooves	80	70	60	50	34	30	48	36	44	24	20	32	32	32	30	24	18	20	24	12	12	12
Depth of Grooves, in m/m	1·5	1·5	1·25	1·25	1·00	1·00	1·00	1·00	1·5	0·75	1·20	1·25	1·00	0·75	0·58	0·305	0·305	0·3	0·3	0·37	0·4	0·4
Twist of Rifling, in m/m and degrees	9600	8400	7200	6000	4200	3600	6°	4902·5	..	..	..	..	3048	1919·02	2250	1710	6°	1260	6°	1·107	1·131	1·110
Weight of the empty projectile: Armour-piercing proj., in kgs	472·20	315·0	198·0	114·6	39190	24100	39500	39190	44350	3878	1440	..	13920	56·0	6410	2605	1093	1093	2546	0·488	0·488	0·409
Common Shell, in kgs.	393·60	265·60	167·00	98·00	31946	21400	38·00	34946	40445	3770	1440	17400	12620	560	6390	2633	1108	1108	2574	0·407	0·407	0·409
Ring Segment, in kgs.	402·30	268·00	168·50	99·00	3383·5	21600	..	33835	44990	3760	..	..	..	..	..	..	..	..	..	..	..	..
Semi piercing, in kgs.	399·86	363·109	167·00	98207	34260	20043	..	31260	..	..	..	..	12920	..	..	..	..	..	..	..	..	..
Case Shot, in kgs.	..	..	..	..	..	..	..	..	..	..	..	..	..	6000	..	2224	1264	1264	2240	0·616	0·616	..
Weight of the explosive charge: For the Armour-piercing, in kgs.	7500	5000	3000	1900	0·512	0·340	0·500	0·512	0·860	0·122	0·060	..	0·500	0·230	0·227	0·078	0·038	0·038	0·115	0·015	0·015	0·013
„ Common Shell, in kgs	21000	14000	9000	5000	1695	0·950	1430	1695	4225	0·230	0·060	0·350	1350	0·260	0·250	0·065	0·038	0·038	0·085	0·022	0·022	0·013
„ Ring Segment, in kgs.	17500	12000	7500	4000	1216	0·800	..	1216	0·445	0·240	..	..	..	..	..	..		..	..	..	..	..
„ Semi-piercing, in kgs.	..	..	..	..	..	..	..	..	..	..	..	..	1061	..	..	..	..	..	..	..	..	..
Muzzle Velocity, in metres	620	620	647·1	620	580	612	800	736	690	710	710	600	884	300	641	570	603	590	670	404	404	549
Muzzle Energy, in metre-tons	9408	6275·9	4400	2290	679·8	469	1309	1094·7	1098	102·9	38·5	326	574·9	27	139·1	45	21·6	20·2	42·5	4	4	6·4

Corrected to April, 1914.

The 12-in. 50-calibre Armstrong gun in the new ships fires a projectile of 249 lb., with muzzle velocity of 29,530 ft., and muzzle energy of 51,600 foot-tons.

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NAVAL ORDNANCE OF SWEDEN.

—	Bofors.	Armstrong.	Armstrong.	Canet and Bofors.	Armstrong.	Whitworth.	Bofors.	Bofors.	Bofors.	Bofors.	Bofors.
N. = belongs to the Navy. C.A. = belongs to the Coast Artillery.	28 cm.k. m/12	25 cm.k. m/85	25 cm.k. m/89	25 cm.k. m/94	24 cm.k. m/90	24 cm.k. m/92	24 cm.k. m/96	24 cm.k. m/04	21 cm.k. m/98	15 cm.k. m/98	15 cm.k. m/03 and m/12
	N.	C.A.	C.A.	N.	C.A.	C.A.	C.A.	C.A.	N.	N.C.A.	N.C.A.
Designation by Calibre, in cms.	28·3	25·4	25·4	25·4	24	24	24	24	21	15·24	15·24
Total Length . . . mm.	12735	8636	8636	10670	8237	8544	10320	12000	9335	6768	7620
Length: Rifled Portion of Bore . mm.	10515	6637	6550	8498	6353	6618	8541	10009·3	7801·1	5693	6265·9
Length: Chamber	1660	1397	1397	1609	1209	1373·1	1299·6	1508·4	1123	787·7	1049·9
Length: Bore, in calibres	44	32	32	40·5	32·4	33·5	41	48	42·5	42·5	48
Number of Grooves	80	42	42	44	42	40	40	40	60	44	44
Twist of Rifling	28	40	40	30	30	30	30	30	30	30	30
Total Weight . . . tons	34·4	30·25	31·03	29·2	23·84	28·1	25	30·44	17·00	5·98	7·75
Weight: Armour-piercing Shell, in kg.	305	204	204	204	181	215	215	215	125	45·4	45·4
Weight: Common Shell . . kg.	—	182	182	182	181	215	215	—	—	—	—
Weight of Firing Charge: Armour-piercing Shell, in kg.	100	41	41	45·2	34	45·5	43	53	30	10·3	15
Weight of Firing Charge: Common Shell . . kg.	—	31·5	31·5	—	—	—	—	—	—	—	—
Muzzle Velocity . . . m.	870	640	640	720	625	640	685	785	750	750	850
Muzzle Energy, total m. ton.	11288	4258	4258	5386	3609	4209	5138	6575	3581	1301	1671
Perforation (K.C. armour, 3000 m.), in cms.	—	14·6	14·6	20·6	13·4	19·0	21·8	35·9	22·9	10·4	15·7

—	Bofors.	Bofors.	Stockholms Vapenfabrik and Finspong.	Stockholms Vapenfabrik and Finspong.	Bofors.	Finspong.	Stockholms Vapenfabrik.	Stockholms Vapenfabrik.	Finspong.	Stockholms Vapenfabrik.	Stockholms Vapenfabrik.
N. = belongs to the Navy. C.A. = belongs to the Coast Artillery.	12 cm.k. m/94 and m/97	12 cm.k. m/03 and m/11	7·5 cm.k. m/05 and m/12	5·7 cm.k. m/89 B and m/99	5·7 cm.k. m/92	5·7 cm.k. m/95 ⊙ B1/95B	5·7 cm.k. m/95 C.	5·7 cm.k. m/95 D.	4·7 cm.k. m/92	4·7 cm.k. m/95	3·7 cm.k. m/98 B
	N.C.A.	C.A.	N.	N.C.A.	N.C.A.	C.A.	C.A.	N.	C.A.	N.	N.C.A.
Designation by Calibre, in cms.	12	12	7·5	5·7	5·7	5·7	5·7	5·7	4·7	4·7	3·7
Total Length . . . mm.	5400	6000	3970	3108	2760	1478	1504	1900	1200	2572	1450
Length: Rifled Portion of Bore . mm.	4665	5013	3129	2517·5	2328	1049·5	1049·5	1447·5	817·3	2034·5	1126
Length: Chamber	474	742	560·5	265	229	205	205	200	175	2572	133·4
Length: Bore, in calibres	43	48	49	49	41·5	22	23	30	22	49	34
Number of Grooves	36	36	28	24	24	24	24	24	24	20	16
Twist of Rifling	30	30	30	30	30	25	25	27	25	30	30
Total Weight . . . tons	2·8	3·7	0·950	0·380	0·334	{0·216 0·206}	0·212	0·189	0·116	0·243	0·0773
Weight: Armour-piercing Shell, in kg.	21	21	—	—	—	—	—	—	—	—	—
Weight: Common Shell . . kg.	21	21	6·5	2·722	2·722	2·722	2·722	2·722	1·5	1·5	0·8
Weight of Firing Charge: Armour-piercing Shell, in kg.	4·3	7·0	—	—	—	—	—	—	—	—	—
Weight of Firing Charge: Common Shell . . kg.	4·3	7·0	1·3	0·435	0·34	0·24	0·24	0·365	0·143	0·3	0·08
Muzzle Velocity . . . m.	740	860	780	704	640	485	485	600	468	740	550
Muzzle Energy, total m. ton.	586	791	201	68·7	56·8	32·64	32·64	49·9	10·73	41·80	12·3
Perforation (K.C. armour, 3000 m.), in cms.	—	10·5	—	—	—	—	—	—	—	—	—

Corrected to April, 1914. For the 11-in. and 12-in. guns, and details of some of the others, *see* the Bofors Company's table, *post*.

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UNITED STATES NAVAL ORDNANCE.

GUN.	MARK.	Length in Calibres.	Total Length	Capacity of Chamber in Cubic Inches.	Travel of Projectile in Inches.	Weight of Gun.	Weight of Projectile.	Weight of Charge.	Muzzle Velocity.	Muzzle Energy.	Penetration at Muzzle, Krupp Armour, using Capped Projectile.	At 3000 Yards. Remaining Velocity.	At 3000 Yards. Penetration.	At 6000 Yards. Remaining Velocity.	At 6000 Yards. Penetration.	At 9000 Yards. Remaining Velocity.	At 9000 Yards. Penetration.
			inch.			tons.	lb.	lb.	ft.-seconds.	ft.-tons.	inch.	ft.-seconds	inch.	ft.-seconds.	inch.	ft.-seconds.	inch.
3-in. B.F.G.	II., III.	50	151	219	128·3	0·9	13	3·85	2700	658	3·3	1230	1·2	848	0·8	..	..
3-in. S.A.	V., VI.	50	159	219	128·3	1·0	13	3·85	2700	658	3·3	1230	1·2	848	0·8	..	..
4-in. R.F.G.	III., IV., V., VI.	40	164	331	134·5	1·5	33	4·85	2000	915	3·4	1156	1·7	897	1·2	..	..
4-in. R.F.G.	VII.	50	205	652	168·3	2·6	33	9·0	2500	1,430	4·6	1432	2·2	979	1·4	853	1·2
4-in. R.F.G.	VIII.	50	205	652	168·3	2·9	33	12·3	2800	1,794	5·3	1627	2·6	1033	1·5	878	1·2
5-in. R.F.G.	II., III., IV.	40	206	656	165·8	3·1	50	10·0	2300	1,852	5·3	1286	2·6	934	1·7	829	1·4
5-in. B.L.R.	V., VI.	50	256	1,200	215·6	4·6	60	19·2	2700	3,032	6·2	1692	3·5	1102	2·0	928	1·6
5-in. B.L.R.	VI.	50	256	1,200	215·6	4·6	50[1]	20·5	3000[1]	3,122	6·4	1732	3·2	1057	1·7	877	1·4
5-in. R.F.G.	VII.	51	261	1,135	215·6	5·0	50	23·8	3150	3,439	6·8	1835	3·4	1091	1·8	895	1·4
6-in. R.F.G.	II., III.	30	196	1,287	150·0	4·8	105	18·8	1950	2,768	5·3	1305	3·2	1009	2·3	909	2·0
6-in. R.F.G.	IV., VII.	40	256	1,320	205·8	6·0	105	18·8	2150	3,365	6·0	1440	3·6	1058	2·4	934	2·1
6-in. R.F.G.	IX.	45	270	1,320	221·7	7·0	105	18·8	2250	3,685	6·3	1511	3·8	1086	2·5	948	2·1
6-in. B.L.R.	VI	50	300	2,101	247·5	8·3	105	30·0	2600	4,920	8·6	1770	4·7	1207	2·9	996	2·2
6-in. B.L.R.	VIII.	50	300	2,101	247·5	8·6	105	37·0	2800	5,707	11·3	1923	5·2	1297	3·2	1026	2·3
7-in. B.L.R.	II.	45	323	3,613	259·8	12·7	165	58·0	2700	8,338	9·6	1948	6·4	1382	4·2	1083	3·0
8-in. B.L.R.	III., IV.	35	305	3,170	245·8	13·1	260	43·8	2100	7,948	8·6	1576	6·0	1206	4·2	1040	3·6
8-in. B.L.R.	V. and VI.	45	369	5,243	299·1	18·7	260	98·5	2750	13,360	12·0	2106	8·6	1589	6·1	1227	4·4
10-in. B.L.R.	I., II.	30	329	6,779	251·1	25·1	510	90·0	2000	14,141	10·7	1590	8·0	1274	6·1	1103	5·0
10-in. B.L.R.	III.	40	413	10,222	327·0	34·6	510	207·5	2700	25,772	19·4	2184	11·9	1747	9·0	1406	6·9
12-in. B.L.R.	I., II.	35	441	11,991	345·2	45·3	870	160·0	2100	26,596	14·2	1733	11·2	1433	8·8	1219	7·2
12-in. B.L.R.	III., IV.	40	493	17,096	392·2	52·1	870	237·5	2400	34,738	19·8	1994	13·3	1649	10·5	1376	8·3
12-in. B.L.R.	III., IV.	40	493	17,096	392·2	52·1	870	305·0[2]	2600[2]	40,768	18·5	2171	14·8	1801	11·7	1500	9·3
12-in. B.L.R.	V.	45	553	16,974	452·0	52·9	870	305·0	2700	43,964	19·4	2259	15·5	1877	12·3	1561	9·8
12-in. B.L.R.	VI.	45	553	14,970	452·0	53·6	870	340·0[3]	2850[3]	48,984	20·8	2393	16·6	1991	13·3	1653	10·6
12-in. B.L.R.	VII.	50	607	14,296	506·3	56·1	870	340·0[3]	2950[3]	52,483	25·7	2483	17·5	2071	13·9	1719	11·0
13-in. B.L.R.	I., II.	35	479	15,068	374·9	61·4	1130	180·0	2000	31,333	15·0	1679	12·0	1414	9·7	1221	8·1
14-in. B.L.R.	I.	45	642	..	..	63·6	1400	365·0	2600	65,606	28·3*	..	23·4*	..	..	..	..

* Harveyized armour.

Corrected to April, 1914.

For the 16-in. gun see the Bethlehem table, *post*.

ELSWICK B.L. AND Q.F. GUNS AND HOWITZERS.

This Table is supplied by the Manufacturers.

GUNS.

		Semi-Automatic	Semi-Automatic		Semi-Automatic		Naval Landing.	Balloon Attack		Semi-Automatic	Jointed Gun.			Semi-Automatic
Diameter of Bore ....ins.	1·85	1·85	1·85	2·24	2·24	2·953	3	3*	3	3	3	4	4	4
do. do. ....mm.	47	47	47	57	57	75	76	76	76	76	76	102	102	102
Length of Bore ....cals.	40	46	50	40	50	14·13	18·8	28	50	50	19·2	40	50	40
	cwts.	cwts.	cwts.	cwts.	cwts.	cwts.	cwts.	cwts.	cwts.	cwts.	cwts.	cwts.	cwts.	cwts.
Weight of Gun	4·51	5·0	7·5	7·5	10·5	1·875	4	8	17·75	23	4·5	26	42	27
do. do. ....kilos.	230	254	381	381	533	95	203	406	901	1168	229	1321	2134	1360
do. Projectile ....lbs.	3·3	3·3	3·3	6	6	11·75	12·5	12·5	12·5	14·33	14·33	31	31	31
do. do. ......kilos.	1·5	1·5	1·5	2·722	2·722	5·33	5·67	5·67	5·67	6·5	6·5	14·06	14·06	14·06
	oz.	oz.	lb. oz.	oz.	lb. oz.	oz.	oz.	lb.	lb. oz.	lb.	ozs.	lb.	lb.	lb.
do. Charge, M.D. Cordite	8·25	10·0	1 0	10	1 2·5	7·75	15	1·1	3 0	5·75	15	5·5	10·5	5·0
do. do. do. kilos.	0·234	0·283	0·453	0·283	0·525	0·22	0·369	0·5	1·36	2·608	0·425	2·495	4·76	2·27
Muzzle Velocity ....f.s.	2132	2360	2680	1968	2400	1100	1585	1640	2600	3050	1185	2300	3000	2300
do. do. ......m.s.	650	701	817	600	731	335	483	500	792	930	452	701	914	701
Muzzle Energy ....f.t.	104	121	164	161	240	98	213	233	586	922	218	1137	1934	1137
do. do. ....m.t.	32·2	37·5	50·8	49·8	74·3	30·3	66	72	181·5	285·5	67·5	352·1	599	352
Penetration at Muzzle ...ins. (Tressider Wrought Iron Pl.)	5·15	5·8	7·3	5.4	7·3	..	..	5·1	10·3	13·7	..	11·6	17·4	11·6
do. do. ...mm.	130·8	147·3	185·4	137·2	185·4	..	..	129·5	261·6	348·0	..	291·6	442·0	291·6
Rounds per Minute	25	30	30	25	30	20	20	20	20	25	15	15	12	20

Diameter of Bore ....ins.	4·7	4·7	5	5·5	6	6	7·5	7·5	8	8	9·2	9·2	10	10
do. do. ....mm.	120	120	127·2	139·7	152	152	190	190	203	203	234	234	254	254
Length of Bore ....cals.	45	50	45	50	45	50	45	50	45	50	45	50	45	50
	cwts.	cwts.	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons
Weight of Gun	53	66	4·05	5·65	8·4	8·75	13·8	15·75	18·0	20·4	26·75	28·82	36·25	38·25
do. do. ....kilos.	2692	3353	4114	5740	8535	8890	14021	16003	18289	20727	27179	29289	36832	38864
do. Projectile ....lbs.	45	45	60	83	100	100	200	200	250	250	380	380	500	500
do. do. ......kilos.	20·41	20·41	27·2	37·6	45·36	45·36	90·72	90·72	113·4	113·4	172·37	172·37	226·8	226·8
	lb. oz.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.
do. Charge, M.D. Cordite	9 11	14	16	25·0	31	33·0	74	76	80	90	122	136	167	200
do. do. do. kilos.	4·395	6·35	7·25	11·34	14·061	15·0	33·566	34·473	36·29	40·82	55·34	61·7	75·75	90·72
Muzzle Velocity ....f.s.	2600	3000	2700	2900	2800	3000	2900	3000	2845	3000	2750	3000	2800	3000
do. do. ......m.s.	792	914	823	884	853	914	884	914	867	914	838	914	853	914
Muzzle Energy ....f.t.	2109	2808	3032	4840	5436	6240	11663	12181	14031	15000	19926	23714	27181	31203
do. do. ....m.t.	653	869·6	939	1499	1683·4	1932	3611·9	3865·2	4345·2	4831·2	6171	7340	8418	9663
Penetration at Muzzle ...ins. (Tressider Wrought Iron Pl.)	15·6	19·3	18·4	25·8	22·9	25·5	30·6	32·3	32·2	34·9	35·2	40·1	39·7	44·1
do. do. ...mm.	396·2	490·2	724	701·0	581·6	647·7	777·2	820·4	817·9	886·4	894·1	1018·5	1008·4	1120·1
Rounds per Minute	12	12	10	10	9	9	6	6	5	5	4	4	3	3

Diameter of Bore ....ins.	12	12	13·5	14	15	15	16
do. do. ....mm.	305	305	343	355·6	381	381	406·4
Length of Bore ....cals.	45	50	45	45	40	45	40
	tons	tons	tons	tons	tons	tons	tons
Weight of Gun	59·3	66·7	76	85	85	98·6	105
do. do. ....kilos.	60252	67770	77216	86364	86364	96118	106680
do. Projectile ....lbs.	850	850	1250	1400	1920	1925	2200
do. do. ......kilos.	385·55	385·55	567	635	871	873·2	998
	lb.	lb.	lb.	lb.	lb.	lb.	lb.
do. Charge, M.D. Cordite	260	285	296	324	380	400	390
do. do. do. kilos.	117·93	129·3	134·26	147	172·3	181	177
Muzzle Velocity .... f.s.	2800	3000	2700	2700	2362	2500	2340
do. do. ....m.s.	853	914	823	823	720	762	713
Muzzle Energy ....f.t.	46208	53046	63187	70770	74275	83125	83530
do. do. ....m.t.	14310	16428	19568	21916	23002	25835	25868
Penetration at Muzzle ...ins. (Tressider Wrought Iron Pl.)	47·3	52·5	51·3	53·2	49·1	53·7	50·4
do. do. ...mm.	1201·4	1333·5	1303·0	1351·3	1247	1364	1280
Rounds per Minute	2	2	2	2	2	2	2

HOWITZERS AND FIELD GUNS.

		Mountain Gun.	Field.	Horse and Field.	Field.	Howitzers.			Field Position.	Howitzers.							
Diameter of Bore ...	ins.	2·953	3	3	3·3	4	4·3	4·7	5	5	6	8	9·2	11	11·24	12	
,, ,, ...	mm.	75	76	76	84	102	109·2	120	127	127	152	203	234	279·4	285·5	305	
Length of Bore ...	calibres	15·2	28	23	28	8·75	12·5	12	32	8·4	12·2	12	13·7	12	15	17	
		lb.	cwt.	cwt.	cwt.	lb.	cwt.	cwt.	tons	cwt.	ton	tons	tons	tons	tons	tons	
Weight of Gun		260	7·25	6	9	220	7	8	2	9	1	2·6	4·3	5·5	7·85	12·55	
,, ,, ...	kilos.	118	368	305	457	100	356	406	2032	457	1016	2642	4369	5588	7976	12751	
,, Projectile	lbs.	12·5	14·3	12·5	18·5	20	40	35	60	50	100	240	290	500	661·38	981	771
,, ,,	kilos.	5·67	6·49	5·67	8·39	9·07	18·14	15·87	27·22	22·68	45·36	108·9	131·5	227	300	445	350
		oz.	oz.	lb. oz.	lb. oz.	oz.	oz.	lb. oz.	lb. oz.	oz	lb.	lb.	lb.	lb.	lb.	lb.	lb.
,, Charge M.D. Cordite		10	20¼	1 4	1 6	8¼	16¼	1 4¼	9 8	12	3	7·5	14	20	32	53	56·25
,, ,, ,,	kilos.	0·283	0·582	0·567	0·624	0·241	0·461	0·582	4·31	0·34	1·361	3·4	6·35	9·07	14·51	24	25·51
Muzzle Velocity	f.s.	1250	1755	1700	1635	950	980	1150	2150	782	1000	1000	1250	1220	1230	1350	1585
,, ,, ...	m.s.	381	535	518	498	290	298	350	655	238	305	305	381	372	375	411·5	483

Corrected to April, 1914.

* This gun can be arranged for anti-torpedo boat attack also.

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VICKERS' GUNS AND MOUNTINGS.

This Table is supplied by the Manufacturers.

		37 m/m Auto.	37 m/m Auto.	40 m/m Auto.	3-pdr. Semi-Auto.	6-pdr. Semi-Auto.	3-in. Semi-Auto.	4-in. Semi-Auto.	4-in. B.L.	4·7-in. B.L.	4·7-in. B.L.	4·7-in. Q.F. Naval Howitzer.	6-in. B.L.	6-in. B.L.	6 in. Semi-Auto.
		30 cal.	42·5 cal.	39·4 cal.	50 cal.	50 cal.	50 cal.	40 cal.	50 cal.	45 cal.	50 cal.	18 cal.	45 cal.	50 cal.	50 cal.
Diameter of Bore	ins.	1·457	1·457	1·575	1·85	2·244	3	4	4	4·724	4·724	4·724	6	6	6
Length of Bore	ins.	43·5	62	62	92·5	112·2	150	169	201·15	212·6	228·45	85	269·5	300	300
Length of Gun	ins.	73·75	94	96	9[illegible]·9	118·6	157	166·6	208·45	220	236·2	89·9	279 2	310·07	311·17
		cwts.	cwts.	cwts.	cwts.	cwts.	cwts.	cwts.	cwts.	tons	tons	cwts.	tons	tons	tons
Weight of Gun		3·75	5·42	4·42	5·5	9·3	19	25	41	3·2	3·2	11·4	7·4	7·8	8·95
Weight of Projectile	lbs.	1	1·25	2	3·3	6	12·5	31	31	45	45·14	45	100	100	100
Muzzle Velocity	f.s.	1800	2300	2000	2800	2600	2700	2300	3030	2800	3050	1200	2900	3100	2900
Muzzle Energy	f.t.	22 5	45·85	55·5	179·4	281	632	1137	1975	2445	2910	450	5830	6665	5830
Penetration of Wrought Iron Plate at Muzzle, Gavre formula	ins.	1·9	3·3	3·5	6·7	7·5	9·65	10·8	16	15·9	17·8	..	22·6	24·8	22·6
Rounds per minute		300	300	200	30	28	25	20	15	12	12	10	10	10	8
Weight of Mounting complete with Shield		c. q. lb. 4 1 10	c. q. lb. 4 3 20	c. q. lb. 7 1 0	c. q. lb. 11 2 0	c. q. lb. 18 1 0	c. q. lb. 21 1 0	c. q. lb. 30 2 0	c. q. lb. 46 3 0	t. c. q. l. 3 13 3 0	t. c. q. l. 6 15 0 0	t. c. q. l. 4 2 0 0	t. c. q. l. 9 5 0 0	t. c. q. l. 12 2 0 0	t. c. q. l. 12 0 0 0
Weight of shield		q. lb. 3 11	q. lb. 1 22	..	c. q. lb. 1 0 0	c. q. lb. 1 2 8	c. q. lb. 2 1 0	c. q. lb. 1 1 0	none.	c. q. lb. 17 0 0	t. c. q. l. 2 10 0 0	t. c. q. l. 2 0 0 0	t. c. q. l. 3 5 0 0	t. c. q. l. 5 6 0 0	t. c. q. l. 5 5 0 0
Thickness of Shield	ins.	·1875	·16	..	·25	·25	·25	·28	none.	2 & ·35	4 3	2	3	4·5	3 to 1·5
Angle of Elevation	deg.	16	15	80	20	20	20	20	15	15	15	70	15	15	15
Angle of Depression	deg.	25	20	10	10	10	10	10	10	7	7	5	5	5	5

		8-in. B.L.	9·2-in. B.L.	9·2-in. B.L.	10-in. B.L.	10-in. B.L.	12-in. B.L.	12-in. B.L.	13·5-in. B.L.	14-in. B.L.	15-in. B.L.	15-in. B.L.	16-in. B.L.	16-in. B.L.
		50 cal.	45 cal.	50 cal.	45 cal.	50 cal.	45 cal.	50 cal.	45 cal.	45 cal.	40 cal.	45 cal.	40 cal.	45 cal.
Diameter of Bore	ins.	8	9·2	9·2	10	10	12	12	13·5	14	15	15	16	16
Length of Bore	ins.	388.75	429·3	460	450	486	540	600	607.5	630	600	675	640	720
Length of Gun	ins.	400	442·35	473	464·6	500	557·55	617·7	625·9	648·4	620·3	695·3	661·25	741·25
		tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons
Weight of Gun		14·6	26·85	27·8	34·85	28·7	57·7	65·85	76·1	80·25	82·5	97	100	117
Weight of Projectile	lbs.	247·4	380	380	500	496·6	850	850	1400	1488	1900	1900	2240	2240
Muzzle Velocity	f.s.	3000	2800	2950	2780	2863	2850	3010	2500	2525	2350	2500	2350	2450
Muzzle Energy	f.t.	15440	20660	22930	26800	28225	47875	53400	60670	65790	72750	82340	85780	95230
Penetration of Wrought Iron Plate at Muzzle. Gavre Formula	ins.	33	35·3	38	38·9	40·2	48·3	52·1	50	51·5	51	56	54	57
Rounds per minute		6	4	4	3	3	2	2	1·5	1·35	1·2	1·2	1·2	1·2

Corrected to April, 1914.

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VICKERS' GUNS AND MOUNTINGS.

AIR-CRAFT AND ANTI-AIR-CRAFT GUNS.

	Aircraft.		Anti-Air-craft.							
	1-in. Auto.	37 m/m. Semi-Auto.	1 in. Auto.	37 m/m. Auto.	40 m/m. Auto.	3-pdr. Semi-Auto.	3-in. Q.F.	3-in. Semi-Auto.	3-in. Semi-Auto.	4-in. Semi-Auto.
	30 cal.	26·12 cal.	40 cal.	42·55 cal.	39·37 cal.	50 cal.	23 cal.	40 cal.	45 cal.	40 cal.
Diameter of Bore . . . . . . .ins.	1	1·457	1	1·457	1·575	1·85	3	3	3	4
Length of Bore . . . . . . .ins.	30	38·06	40	62	62	92·5	70	120	135	160
Length of Gun . . . . . . .ins.	55	40·25	63·7	91	96	98·9	73·7	126·1	141·6	166·6
	lbs.	lbs.	lbs.	lbs.	lbs.	cwts.	cwts.	cwts.	cwts.	cwts.
Weight of Gun	110	110	187	490	496	6	5	12·5	18	25
Weight of Projectile . . . . .lbs.	·441	1·5	·551	1·5	2	3·3	12·5	14·33	10·83	31
Muzzle Velocity . . . . f.s.	1542	1200	2000	2100	2000	2575	1640	2065	2700	2300
Muzzle Energy . . . . f.t.	7·25	15	15·5	46	55·5	152	233	424	554	1137
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	cwts.	cwts.	cwts.
Weight of Mounting	65	145	333	800	1102	1204	2090	25	32	50
Angle of Elevation . . . . . degs.	40	30	80	80	80	80	90	90	80	90
Angle of Depression . . . . . degs.	90	30	10	10	5	5	5	0	0	10
Rounds per minute	150	—	250	200	200	25 to 30	20	25	25	20

HOWITZERS, LANDING AND FIELD GUNS.

	75-mm. Jointed Mountain Gun.	3-in. Mountain Gun.	3-in. Landing Gun.	3-in. Field.		Howitzers.					
				Light.	Heavy.	4·33-in.	4·7-in.	6-in.	8-in.	9·2-in.	11-in.
Diameter of Bore . . . ins.	2·953	3	3	3	3	4·33	4·724	6	8	9·2	11
Length of Bore . . . ins.	45·66	42·91	66	64·96	99·5	58·45	66·15	94·5	128	128·8	154
Length of Gun . . . ins.	50	47·23	70·34	69·3	103·8	63·55	71·05	102·8	138·2	141·2	148·25
Weight of Projectile . lbs.	14·33	12·5	12·5	12·5	14·33	35·25	45	90·3	216·7	290	758
Weight of Gun . . cwts.	3·5	2·45	3·9	4·5	7·5	7·25	9·75	18·75	46·75	tons 3	tons 5·85
Muzzle Velocity . . . f.s.	1150	1150	1640	1600	1660	1100	1000	1285	1100	1300	1000
Muzzle Energy . . . f.t.	131	115	233	220	274	296	312	1035	1820	3400	5260
	c. q. l.	c. q. l.	c. q. l.	t. c. q. l.	t. c. q. l.	t. c. q. l.	t. c. q. l.	t. c. q. l.	t. c. q. l.	t. c. q. l.	t. c. q. l.
Weight of Mounting complete with Shield . . .	9 0 0	7 1 0	9 2 0	0 11 3 0	0 14 0 0	0 17 0 0	0 17 2 0	2 14 3 0	3 11 0 0	5 9 0 0	
Weight of Shield	0 3 22	0 2 17	1 1 15	0 0 3 10	0 1 0 15	None	0 1 2 8	0 3 3 0	0 3 0 0	None	
Thickness of Shield . . .	·128	·125	·192	·125	·144	None	·157	·236	·236	None	
Angle of Elevation . . .	30°	25°	23°	16°	16°	50°	43°	50°	40°	55°	
Angle of Depression . . .	10°	15°	10°	6°	10°	5°	5°	None	None	—	

Corrected to April, 1914.

COVENTRY ORDNANCE WORKS' GUNS.

This Table is supplied by the Manufacturers.

—	3-pdr., 50 cal.	6-pdr., 50 cal	Mountain 3·3-in. 20-pdr., Howitzer.	Field. 12¼ pdr., 23 cal.	Field. 18-pdr., 33·44 cal.	Field. 4·65-in. Howitzer.	Field. 6-in. Howitzer.	3-in., 40 cal.	3-in., 50 cal.	4-in., 40 cal.	4-in., 50 cal.	4·7-in., 50 cal.	6-in., 50 cal.	7·5-in., 50 cal.	9·2-in., 50 cal.	11·02-in., 50 cal.	12-in., 50 cal.	13·5-in., 45 cal.	14-in., 45 cal.	15-in., 45 cal.
Diameter of Bore . in.	1·85	2·244	3·3	3·0	3·0	4·65	6·0	3·0	3·0	4·0	4·0	4·7	6·0	7·5	9·2	11·2	12·0	13·5	14·0	15·0
Diameter of Bore . m.m.	47	57	83·8	76·2	76·2	117·5	152·4	76·2	76·2	101·6	101·6	120·0	152·4	190·5	233·7	280	304·8	342·9	355·6	—
Length of Gun . . in.	99·0	119·0	45·25	75·0	100·34	72·0	101·5	123·6	151·5	166·4	208	242·5	310	387·5	475	568	617·7	630	648·7	695·4
Weight of Charge . lb.	1·1	1·75	0·5	1·0	1·626	1·1	5·0	2·0	5·25	5·25	11·25	16·0	31·0	71·0	95	270	285	290	305	386
Weight of Projectile lb.	3·3	6·0	20·0	12·5	15·0	37·5	100	12·5	12·5	31	31	45	100	200	380	760	850	1250	1600	1950
Weight of Gun	c 6	c. 10	c q. 2 2	c. q. l. 6 0 8	c. q 8 2	c. q. 8 2	t c. q. 1 2 2	c. q. 12 1	c. q. l. 18 2 21	t. c. q. l. 1 5 3 15	t. c. 2 2	t. c. q. 3 14 2	t. c. 8 15	t. c. 15 10	t. 28	t. 42	t. 67	t. c. 76 10	t. 81	t. 106
Muzzle Velocity . f.-sec.	2800	2800	860	1600	1850	1000	1120	2300	3000	2300	3000	3000	2950	2950	2950	2950	2950	2600	2450	2450
Muzzle Energy . f.-tons	179·4	326	102	222	356	260	870	458·5	780	1137	1934	2810	6034	12068	22930	45861	51290	58590	66580	81163
Penetration of Wrought-Iron Plate at Muzzle in.	..	..	..	..	..	..	..	7·7	11·25	10·8	16·0	17·4	23·1	29·8	37·9	51·2	50·65	49·1	51·7	52·5
Penetration of Hard Steel Plate at 5000 yards . . in.	..	..	..	..	..	..	..	..	..	..	..	2·6	5·5	8·5	12·3	18·0	18·3	18·3	20·7	21·0

Corrected to April, 1914.

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BEARDMORE GUNS.

This Table is supplied by the Manufacturers.

Gun Calibre.	Length of Bore.	Weight of Gun.	Weight of Shot.	Muzzle Velocity.	Remaining Velocity at a Range of			
					3000 yards.	5000 yards.	6000 yards.	10,000 yards.
inches.	calibres.	tons.	lbs.	ft. secs.	ft. secs.	ft. secs.	ft. secs.	ft. secs.
4·0	50	2·1	31	3000	2045	..	1322	..
5·0	50	4·3	60	2950	2172	..	1533	..
6·0	50	8·2	100	3000	2313	..	1725	..
9·2	50	28·5	425	2810	..	2198	..	1670
12·0	50	66·0	950	2820	..	2346	..	1917
13·5	46	77·0	1375	2620	..	2220	..	1854
15·0	42	90·0	1850	2550	..	2187	..	1853

Corrected to March, 1914.

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SCHNEIDER GUNS.

The information in this Table is given by the Manufacturers.

Calibre, in millimètres.	400		370		340		305		240		150		120		100		75		47	37
Calibre, in inches	15·7	15·7	14·5	14·5	13·4	13·4	12·0	12·0	9·4	9·4	5·9	5·9	4·7	4·7	3·9	3·9	2·9	2·9	1·8	1·4
Length, in calibres	40	45	40	45	40	45	45	50	45	50	45	50	45	50	45	50	50	60	60	60
Weight, in tons	99·4	102·5	78·9	83·6	63·7	66·3	52·9	57·3	25·8	27·9	6·3	6·8	3·2	3·5	1·9	2·0	·85	1·2	·30	·17
Weight of A.P. Projectile, lb.	2183	2183	1719	1719	1332	1332	826	826	407	407	99	99	48	48	28·6	28·6	14·3	14·3	3·3	1·76
Weight of Charge, in lb.	540	540	496	496	447	447	353	375	165	176	39·6	40·7	17·8	18·4	13·2	13·8	5·5	6·2	1·3	..
Muzzle Velocity, ft.-secs.	2428	2493	2493	2575	2559	2675	2952	3116	2952	3116	2952	3116	2952	3116	2952	3116	2871	3035	3116	3116
Muzzle Energy, ft.-tons	89444	94287	74268	79272	60706	65388	50007	55717	24667	27487	6001	6686	2932	3268	1734	1931	820	917	223	119
Perforation of Steel at muzzle (ins.)	...	..	..	.	..	..	38·3	41·6	30·1	32·3	18·2	20·1	13·9	15·0	11·6	12·5	9·3	10·0	5·9	5·0
Perforation of Steel at 3000 yards (ins.)	..	..	..	..	..	..	29·3	31·9	21·2	23·1	10·2	11·8	6·4	6·9	4·6	4·9	..	..	..	..
Perforation of Steel at 6000 metres (6561 yards) ins.	17·9	18·7	16 6	17·5	15·2	16·1	..	..	..	..	..	..	..	..	..	..	..	..	..	..

Corrected to April, 1914.

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N.B.—The guns marked with an asterisk, as well as some shorter and smaller guns, are included in the new German official table of ship guns.]

KRUPP SHIP AND COAST GUNS.

From tables supplied by the Company, April 1914.

Calibre	cm.	7·5 = 2·9 in.			8·8 = 3·4 in.			10·5 = 4·1 in.			12 = 4·7 in.			15 = 5·9 in.			17 = 6·7 in.			19 = 7·4 in.		
Length of Bore	cals.	40	45	50	40*	45	50	40*	45	50	40	45	50	40*	45*	50	40*	45	50	40	45	50
Length of Bore	mm.	3000	3375	3750	3520	3960	4400	4200	4725	5250	4800	5400	6000	5965	6710	7455	6905	7765	8630	7600	8550	9500
Total Length	„	3195	3570	3945	3750	4190	4630	4475	5000	5525	5110	5710	6310	6355	7100	7845	7355	8215	9080	8095	9045	9995
Weight of Gun	kg.	677	764	850	1094	1231	1373	1555	1755	1950	2325	2620	2910	4460	5020	5590	6930	7800	8680	9230	10400	11550
Weight of Projectile	„	5·8	5·8	5·8	9·5	9·5	9·5	16	16	16	24	24	24	46	46	46	70	70	70	95	95	95
Weight of Charge	„	1·65	1·86	2·09	2·66	3·0	3·37	5·05	5·80	6·60	7·5	8·65	9·85	14·4	16·6	18·9	22·4	25·7	29·3	29·8	34·3	39·1
Muzzle Velocity	m.	840	890	940	840	890	940	840	890	940	840	890	940	840	890	940	840	890	940	840	890	940
Muzzle Energy	mètre-tons	208·6	234·2	261·2	341·7	383·5	427·8	575	646	721	863	969	1081	1654	1857	2072	2517	2826	3152	3417	3835	4278
Muzzle Penetration (Steel)	mm.	203	220	238	243	264	285	292	317	344	338	367	397	426	463	500	492	535	578	553	600	649

Calibre	cm.	21 = 8·2 in.		
Length of Bore	cals.	40*	45*	50*
Length of Bore	mm.	8370	9420	10465
Total Length	„	8915	9965	11010
Weight of Gun	kg.	12330	13900	15450
Weight of Projectile	„	125	125	125
Weight of Charge	„	39·9	45·8	52·3
Muzzle Velocity	m.	840	890	940
Muzzle Energy	mètre-tons	4495	5047	5629
Muzzle Penetration (Steel)	mm.	606	658	711

Calibre	cm.	24 = 9·4 in.					
Length of Bore	cals.	40*		45		50	
Length of Bore	mm.	9600		10800		12000	
Total Length	„	10225		11425		12625	
Weight of Gun	kg.	18600	16750	21000	19000	23300	21450
Weight of Projectile	„	190	190	190	190	190	190
Weight of Charge	„	60·1	51·8	69·1	60·1	78·8	69·8
Muzzle Velocity	m.	840	800	890	850	940	900
Muzzle Energy	mètre-tons	6833	6198	7671	6997	8557	7844
Muzzle Penetration (Steel)	mm.	703	658	766	717	828	778

Calibre	cm.	28 = 11 in.					
Length of Bore	cals.	40*		45*		50*	
Length of Bore	mm.	11200		12600		14000	
Total Length	„	11930		13330		14730	
Weight of Gun	kg.	29550	26600	33300	30200	37000	34050
Weight of Projectile	„	300	300	300	300	300	300
Weight of Charge	„	95	82	110	95	125	111
Muzzle Velocity	m.	840	800	890	850	940	900
Muzzle Energy	mètre-tons	10790	9790	12110	11050	13510	12390
Muzzle Penetration (Steel)	mm.	828	772	900	842	973	914

Calibre	cm.	30·5 = 12 in.					
Length of Bore	cals.	40		45*		50*	
Length of Bore	mm.	12200		13725		15250	
Total Length	„	12995		14520		16045	
Weight of Gun	kg.	38200	34400	43000	39000	47800	44000
Weight of Projectile	„	390	390	390	390	390	390
Weight of Charge	„	123	106	142	123	162	143
Muzzle Velocity	m.	840	800	890	850	940	900
Muzzle Energy	mètre-tons	14030	12720	15750	14360	17560	16100
Muzzle Penetration (Steel)	mm.	912	850	990	927	1071	1006

Calibre		35·56 = 14 in.					
Length of Bore		40		45		50	
Length of Bore	mm.	14225		16000		17780	
Total Length	„	15150		16925		18705	
Weight of Gun	kg.	60500	54500	68100	61900	75800	69700
Weight of Projectile	„	620	620	620	620	620	620
Weight of Charge	„	196	169	225	196	256	227
Muzzle Velocity	m.	840	800	890	850	940	900
Muzzle Energy	mètre-tons	22300	20220	25030	22830	27920	25600
Muzzle Penetration (Steel)	mm.	1077	1005	1170	1095	1265	1189

Calibre		38·1 = 15 in.					
Length of Bore		40		45*		50	
Length of Bore	mm.	15240		17145		19050	
Total Length	„	16230		18135		20040	
Weight of Gun	kg.	74400	67000	83800	76100	93200	85800
Weight of Projectile	„	760	760	760	760	760	760
Weight of Charge	„	241	207	277	241	315	279
Muzzle Velocity	m.	840	800	890	850	940	900
Muzzle Energy	mètre-tons	27330	24790	30680	27990	34230	31380
Muzzle Penetration (Steel)	mm.	1157	1079	1257	1177	1359	1277

Calibre		40·64 = 16 in.					
Length of Bore		40		45		50	
Length of Bore	mm.	16255		18290		20320	
Total Length	„	17315		19345		21875	
Weight of Gun	kg.	90300	81400	101700	92400	113100	104100
Weight of Projectile	„	920	920	920	920	920	920
Weight of Charge	„	292	252	336	292	383	339
Muzzle Velocity	m.	840	800	890	850	940	900
Muzzle Energy	mètre-tons	33090	30010	37140	33880	41430	37980
Muzzle Penetration (Steel)	mm.	1238	1154	1344	1252	1453	1366

BETHLEHEM STEEL CO.

ORDNANCE.

Table supplied by the Manufacturers, April, 1914.

Calibre.	Length of bore in Calibres.	Calibre.	Weight of Gun.	Weight of Projectile.	At Muzzle.		Penetration of Wrought Iron. (Gavre Formulæ.)	At 3000 yards Range.			At 8000 yards Range.			Limiting ranges beyond which capped armour piercing projectiles will not penetrate hard-faced armour of 12 inches and 7 inches thickness. (Davis Formula.)		Calibre.
					Velocity.	Energy.		Dangerous Space for Target 25 feet high.	Energy.	Penetration of Krupp hard-faced armour by capped armour piercing projectiles, with normal impact. (Davis Formula.)	Dangerous Space for Target 25 feet high.	Energy.	Penetration of hard-faced armour by capped armour piercing projectiles, with normal impact. (Davis Formula.)	12-in. plate.	7-in. plate.	
inches.	calibres.	cms.	lbs.	lbs.	ft. per sec.	foot-tons.	inches.	yards.	foot-tons.	inches.	yards.	foot-tons.	inches.	yards	yards.	inches.
1·457	50	3·7	160	1	2150	32	..	..	..	..	..	..	..	..	..	1·457
1·851	50	4·7	550	3	2400	120	..	..	..	..	..	..	..	..	..	1·851
2·244	50	5·7	960	6	2400	240	..	..	..	..	..	..	..	..	..	2·244
3	50	7·62	1900	13	2800	707	..	..	..	..	..	..	..	..	..	3
			tons.													
4	50	10·16	2·6	33	2800	1,793	11·0	320	890	..	..	..	..	..	..	4
				kilos.												
4	50	10·16	2·6	14	3000	1,924	11·5	362	980	..	..	..	..	..	..	4
				lbs.												
5	45	12·7	3·4	50	2600	2,343	11·3	258	1,096	..	..	..	..	..	..	5
5	50	12·7	4·75	50	3000	3,120	13·8	371	1,514	..	..	..	..	..	..	5
6	45	15·24	7·2	105	2600	4,920	16·9	313	2,970	7·0	60	1,307	4·2	..	2,870	6
6	50	15·24	8·4	105	2800	5,707	18·8	374	3,478	7·7	71	1,543	4·6	..	3,890	6
7	45	17·78	12·7	165	2700	8,338	22·0	358	5,426	9·2	74	2,660	5·9	..	6,063	7
7	50	17·78	14·5	165	2900	9,619	24·4	422	6,263	10·1	87	3,130	6·5	..	7,063	7
8	45	20·32	18·6	260	2800	14,460	29·2	410	9,869	12·3	92	5,457	8·5	3,240	10,420	8
8	50	20·32	22·3	260	2900	15,160	30·7	441	10,616	12·9	100	5,885	8·9	3,950	11,235	8
9·2	50	23·37	30·4	380	2900	22,200	35·8	450	15,760	14·9	107	9,350	10·8	7,237	15,311	9·2
10	45	25·4	35·4	515	2800	27,990	40·5	429	21,080	17·2	106	13,160	12·8	9,075	Over 16,000	10
10	50	25·4	43·9	515	2900	30,020	42·6	453	22,671	18·0	114	14,394	13·6	10,000	”	10
12	45	30·48	53·8	870	2800	47,380	51·8	439	36,794	21·7	114	24,608	16·9	14,560	”	12
12	50	30·48	66·0	870	2900	50,720	54·4	476	39,990	23·0	123	26,495	17·7	15,596	”	12
14	35	35·56	57·4	1660	2150	53,190	50·4	244	44,660	22·3	70	33,650	18·7	Over 16,000	”	14
14	45	35·56	70·3	1400	2600	65,700	56·4	362	50,420	24·0	98	39,840	20·7	”	”	14
15	45	38·1	90·0	1700	2600	79,760	64·1	390	65,330	27·0	100	46,300	21·8	”	”	15
16	45	40·64	110·0	2100	2500	91,110	67·3	400	75,700	28·5	94	61,130	23·3	”	”	16
18	30	45·72	60·0	2075	2150	66,490	49·4	235	52,750	21·1	63	36,365	16·7	15,100	”	18

Guns of 3-inch calibre or under are chambered for fixed ammunition with the powder and projectiles in brass cartridge cases. Guns from 3-inch calibre upwards, and including the 6-inch L-45 gun, can be chambered to use either fixed ammunition, or chambered to use loose ammunition with the powder in cartridge bags and the projectile separate from the powder. Guns above 6-inches calibre and including the 6-inch L-45 gun are chambered for loose ammunition. The breech mechanisms of all guns up to 8 inches are operated by the single motion of a hand-lever. Those of the larger guns are operated by the revolution of a crank.

BOFORS GUNS.

Table supplied by the Manufacturers.

Calibre . . . . cm.	30·5			28			25·4			24			21		
Calibre . . . . in.	12			11·02			10			9·45			8·27		
Length of Gun . . . . cal.	50	45	40	50	45	40	50	45	40	50	45	40	50	45	40
Length of Gun . . . . in.	600·4	540·3	480·3	551·2	496·1	441	500	450	400	472·4	425·2	378	413·4	372	330·7
Weight of Gun . . . tons	50	44	40	39	35	30	29	26	23	24	22	19	16	14·4	12·8
Weight of Projectile . . . lb.	981	981	981	761	761	761	564	564	564	474	474	474	309	309	309
	772	772	772	595	595	595	445	445	445	375	375	375	249	249	249
Weight of Charge . . . lb.	266	239	213	205	184	164	153	138	123	129	116	103	84	75·8	67·5
Muzzle Velocity . . . ft.-secs.	2776	2625	2477	2776	2625	2477	2789	2638	2490	2789	2638	2490	2828	2677	2526
	3140	2969	2802	3140	2969	2802	3140	2969	2802	3140	2969	2802	3150	2979	2812
Muzzle Energy . . . ft.-tons	52583	47019	41877	40767	36452	32468	30536	27320	24349	25647	22944	20448	17174	15391	13705
Penetration of soft steel plate at muzzle de Marres formula } in.	39·8	36·8	33·9	36·4	33·6	30·9	32·9	30·3	27·9	30·8	28·5	26·2	26·7	24·7	22·7
Number of rounds per minute .	2	2	2	2	2	2	3	3	3	4	4	4	4	4	4

Calibre . . . . cm.	19·4			15·24			12			10·5			8·7			7·5		
Calibre . . . . in.	7·64			6			4·72			4·13			3·43			2·95		
Length of Gun . . . . cal.	50	45	40	50	45	40	50	45	40	50	45	40	50	45	40	50	45	40
Length of Gun . . . . . in.	381·9	343·7	305·5	300	270	240	236·2	212·6	189	227·4	206·7	186	188·4	171·3	154·1	162·4	147·6	132·9
Weight of Gun . . . . tons	12·8	11·6	10·3	5·8	5·3	4·7	2·96	2·56	2·37	2·2	2	1·8	1·88	1·14	1·05	0·72	0·665	0·59
Weight of Projectile . . . lb.	251	251	251	112·4	112·4	112·4	59·5	59·5	59·5	39·7	39·7	39·7	22·7	22·7	22·7	14·5	14·5	14·5
	198	198	198	90·4	90·4	90·4	46·3	46·3	46·3	30·9	30·9	30·9	17·6	17·6	17·6	11·5	11·5	11·5
Weight of Charge . . . lb.	68·1	61·3	54·7	33·1	29·8	26·5	16·2	14·5	12·9	10·8	9·7	8·7	6·14	5·53	4·92	3·92	3·53	3·13
Muzzle Velocity . . . ft.-secs.	2786	2635	2487	2897	2749	2582	2789	2638	2474	2871	2733	2585	2864	2726	2582	2848	2717	2572
	3140	2969	2802	3235	3051	2884	3143	2973	2805	3251	3097	2933	3248	3084	2936	3215	3074	2907
Muzzle Energy . . . ft.-tons	13566	12136	10815	6565	5913	5215	3220	2881	2567	2267	2057	1841	1292	1169	1049	817	742·7	668·5
Penetration of soft steel plate at muzzle de Marres formula } in.	24·6	22·7	20·9	19	17·6	16·1	14·7	13·6	12·5	13·2	12·3	11·4	10·8	10·1	9·4	9·2	8·5	7·9
Number of rounds per minute .	5	5	5	9	9	9	11	11	11	15	15	15	17	17	17	20	20	20

Corrected to April, 1914.

Table Relating to Conversion of Measures.

Length.

Metric to English. — **English to Metric.**

I. Mètres.	II. Yards.	III. Feet.	IV. Inches.	V. Yards.	VI. Mètres.	VII. Feet.	VIII. Mètres.	IX. Inches.	X. Centimètres.
1	1·0936	3·2809	39·37	1	0·91438	1	0·30479	1	2·5400
2	2·1873	6·5618	78·74	2	1·82877	2	0·60959	2	5·0799
3	3·2809	9·8427	118·11	3	2·74315	3	0·91438	3	7·6199
4	4·3745	13·1236	157·48	4	3·65753	4	1·21918	4	10·1598
5	5·4682	16·4045	196·85	5	4·57192	5	1·52397	5	12·6998
6	6·5618	19·6854	236·22	6	5·48630	6	1·82877	6	15·2397
7	7·6554	22·9663	275·60	7	6·40068	7	2·13356	7	17·7797
8	8·7491	26·2472	314·97	8	7·31507	8	2·43836	8	20·3196
9	9·8427	29·5281	354·34	9	8·22945	9	2·74315	9	22·8596

Explanation.—To convert any number from one measure to the other, take the values of the different multiples of 10 by shifting the position of the decimal point, and add together. Thus, find the number

of yards in 2354 mètres (see cols. I. & II.). mètres. yards. 2000=2187·3 300= 328·09 50= 54·68 4= 4·37 ∴ 2354=2574·44	of feet in 12·4 mètres (see cols. I. & III.). mètres. feet. 10 =32·809 2 = 6·562 0·4= 1·312 ∴ 12·4=40·683	of inches in 30·5 centimètres (see cols. I. & IV.). Note, 1 m.=100 cm. cms. inches. 30·0=11·811 ·5= ·197 ∴ 30·5=12·008	of mètres in 1026 yards (see cols. V. & VI.). yards. mètres. 1000=914·38 20= 18·29 6= 5·49 ∴ 1026=938·16	of mètres in 1742 feet (see cols. VII. & VIII.). feet. mètres. 1000=304·79 700=213·36 40= 12·19 2= 0·61 ∴ 1742=530·95	of centimètres in 17·72 ins. (see cols. IX. & X.) inches. cms. 10·0 =25·400 7·0 =17·780 0·7 = 1·778 ·02= ·051 ∴ 17·72=45·009

Note.—A ready way of approximately converting all French measures into English inches is to multiply by 4 and apply the decimal point by common sense—Thus for a 15-cm. gun ; 15 × 4 = 60. Now this Calibre cannot be 60 inches, nor can it be 0·6 inch ; therefore it must be 6 inches. (The exact value is 5·906 in.)

Weight.

Metric to English. — **English to Metric.**

I. Kilo-grammes.	II. Tons.	III. Pounds Avoirdupois.	IV. Grains Troy.	V. Tons.	VI. Milliers.	VII. Pounds Avoir-dupois.	VIII. Kilo-grammes.	IX. Grains. Troy.	X. Gramme
1	·000984	2·2046	15432·3	1	1·016	1	0·4536	1	·0648
2	·001968	4·4092	30864·7	2	2·032	2	0·9072	2	·1296
3	·002953	6·6139	46297·0	3	3·048	3	1·3608	3	·1944
4	·003937	8·8185	61729·4	4	4·064	4	1·8144	4	·2592
5	·004921	11·0231	77161·7	5	5·080	5	2·2680	5	·3240
6	·005905	13·2277	92594·1	6	6·096	6	2·7216	6	·3888
7	·006889	15·4323	108026·4	7	7·112	7	3·1751	7	·4536
8	·007874	17·6370	123458·8	8	8·128	8	3·6287	8	·5184
9	·008858	19·8416	138891·1	9	9·144	9	4·0823	9	·5832

Explanation.—To convert any number from one measure to the other, take the values of the different multiples of 10 by shifting the position of the decimal point, and add together. Thus, find the number

of tons in 35 milliers (see cols. I. & II. Note, 1000 kg. =1 millier). milliers. tons. 30 = 29·53 5 = 4·92 ∴ 35 = 34·45	of pounds in 56·3 kilo- grammes. (see cols. I. & III.). kgrms. lbs. 50 =110·231 6 = 13·228 0·3= ·661 ∴ 56·3=124·120	of grains in 120 grammes (see cols. I. & IV. Note, 1000 grms. = 1 kg.) grammes. grains. 100=1543·23 20= 308·65 ∴ 120=1851·88	of milliers in 38 tons (see cols. V. & VI.). tons. milliers. 30 = 30·48 8 = 8·13 ∴ 38 = 38·61	of kilogrammes in 68 pounds (see cols. VII. & VIII) lbs. kgs. 60 = 27·216 8 = 3·629 ∴ 68 = 30·845	of grammes in 85 grains (see cols. IX. & X.). grains. grammes. 80 = 5·184 5 = 0·324 ∴ 85 = 5·508

Note.—7000 grains troy = 1 pound avoirdupois.

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PRESSURE.

Metric to English.			English to Metric.				Atmospheric to English.		English to Atmospheric.	
I. Kilogrammes per square centimètre.	II. Pounds per square inch.	III. Tons per square inch.	IV. Pounds per square inch.	V. Kilogrammes per square centimètre.	VI. Tons per square inch.	VII. Kilogrammes per square centimètre.	VIII. Atmospheres.	IX. Tons per square inch.	X. Tons per square inch.	XI. Atmospheres.
1	14·223	·00635	1	·07031	1	157·49	1	·00656	1	152·38
2	28·446	·01279	2	·14062	2	314·99	2	·01313	2	304·76
3	42·668	·01905	3	·21003	3	472·48	3	·01969	3	457·14
4	56·891	·02540	4	·28124	4	629·97	4	·02625	4	609·52
5	71·114	·03175	5	·35155	5	787·47	5	·03281	5	761·91
6	85·337	·03810	6	·42186	6	944·96	6	·03938	6	914·29
7	99·560	·04445	7	·49217	7	1102·45	7	·04594	7	1066·67
8	113·783	·05080	8	·56248	8	1259·95	8	·05250	8	1219·05
9	128·005	·05715	9	·63279	9	1417·44	9	·05906	9	1371·43

Note.—One atmosphere is taken to be 14·7 lb. per square inch.

Explanation.—To convert any number from one measure to the other, take the value of the different multiples of 10 by shifting the position of the decimal point, and add together. Thus, find the number

of pounds per square inch in 32·1 kilogrammes per square centimètre (see cols. I. & II.).

kgs. per sq. cm.		lbs per sq. in.
30	=	426·68
2	=	28·45
0·1	=	1·42
∴ 32·1	=	456 55

of tons per square inch in 3210 kilogrammes per square centimètre (see cols. I. & III.).

kgs. per sq. cm.		tons per sq. in.
3000	=	19 05
200	=	1·27
10	=	·06
∴ 3210	=	20·38

of kilogrammes per square centimètre in 15 lbs. per square inch (see cols. IV. & V.).

lbs. per sq. in.		kgs. per sq. cm.
10	=	·7031
5	=	·3516
∴ 15	=	1·0547

of kilogrammes per square centimètre in 18 3 tons per square inch (see cols. VI. & VII.).

tons per sq. in.		kgs. per sq. cm.
10	=	1574·9
8	=	1259·95
0·3	=	47·25
∴ 18·3	=	2882·10

of tons per square inch in 3254 atmospheres. (see cols. VIII. & IX.).

atmospheres.		tons per sq. inch.
3000	=	19·69
200	=	1·31
50	=	·33
4	=	·03
∴ 3254	=	21·36

of atmosphere in 14·6 tons per square inch (see cols. X. & XI.).

tons per sq. in.		atmospheres.
10	=	1523·8
4	=	609·5
0·6	=	91·4
∴ 14·6	=	2224·7

ENERGY.

Metric to English.		English to Metric.	
I. Mètre-tons.	II. Foot-tons.	III. Foot-tons.	IV. Mètre-tons.
1	3·2291	1	0·3097
2	6·4581	2	0·6194
3	9·6872	3	0·9291
4	12·9162	4	1·2388
5	16·1453	5	1·5484
6	19·3743	6	1·8581
7	22·6034	7	2·1678
8	25·8324	8	2·4775
9	29·0615	9	2·7872

1 mètre-ton is termed a "dinamode" in Italy.

Explanation.—To convert any number from one measure to the other, take the values of the different multiples of 10 by shifting the position of the decimal point, and add together. Thus find the number

of foot-tons in 4367 mètre-tons (see cols. I. & II.).

mètre-tons.		foot-tons.
4000	=	12916·2
300	=	968·72
60	=	193·74
7	=	22·60
∴ 4367	=	14101·26

of mètre-tons in 3592 foot-tons (see cols. III. & IV.).

foot-tons.		mètre-tons.
3000	=	929·1
500	=	154 84
90	=	27·87
2	=	·62
∴ 3592	=	1112·43

PERFORATION THROUGH IRON AND STEEL WITH THE FACE NOT HARDENED.

To obtain perforation through steel equivalent to a given perforation through iron, and *vice versa*.

1 inch steel = 1¼ inches iron;

that is, 4 inches steel = 5 inches iron.

Thus, given 9·4 inches perforation through iron,

$$9{\cdot}4 \times \frac{4}{5} = 7{\cdot}52 \text{ inches steel;}$$

or, given 5·2 inches steel,

$$5{\cdot}2 \times \frac{5}{4} = 6{\cdot}5 \text{ inches iron.}$$

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PART IV.

STATISTICS, OFFICIAL STATEMENTS AND PAPERS.

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STATEMENT showing the NET EXPENDITURE from NAVY VOTES and LOANS on account of NAVAL SERVICES for the Years 1901–2 to 1912–13, together with the ESTIMATES for 1913–14 and 1914–15.

Year.	Total Expenditure from Navy Votes (Net). (1)	Annuity in Repayment of Loans under the Naval Works Acts. (2)	Total Expenditure exclusive of Annuity [Column (2) deducted from Column (1).] (3)	Expenditure from Loans under Naval Works Acts. (4)	Total of Columns (3) and (4). (5)	Expenditure on New Construction (Vote 8). (6)
	£	£	£	£	£	£
1901–2	30,981,315	122,255	30,859,060	2,745,176	33,604,236	8,865,080
1902–3	31,003,977	297,895	30,706,082	3,198,017	33,904,099	8,534,917
1903–4	35,709,477	502,010	35,207,467	3,261,083	38,468,550	11,115,733
1904–5	36,859,681	634,238	36,225,443	3,402,575	39,628,018	11,263,019
1905–6	33,151,841	1,015,812	32,136,029	3,313,604	35,449,633	9,688,044
1906–7	31,472,087	1,094,309	30,377,778	2,431,201	32,808,979	8,861,897
1907–8	31,251,156	1,214,403	30,036,753	1,083,663	31,120,416	7,832,589
1908–9	32,181,309	1,264,033	30,917,276	948,262	31,865,538	7,406,930
1909–10	35,734,015	1,325,809	34,408,206	—	34,408,206	9,597,551
1910–11	40,419,336	1,322,752	39,096,584	—	39,096,584	13,077,689
1911–12	42,414,257	1,322,752	41,091,505	—	41,091,505	12,526,171
1912–13	44,933,169	1,322,752	48,610,417	—	43,610,417	13,401,358
1913–14 (estimated) . . .	48,809,300	1,311,558	47,497,742	—	47,497,742	14,513,500
1914–15 (estimated) . . .	51,550,000	1,311,558	50,238,442	—	50,238,442	15,282,950

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First Lord's Statement explanatory of Navy Estimates, 1914-15.

THE Estimates for 1914–15 amount to £51,550,000 as compared with original and supplementary Estimates of 1913–14 of £46,309,300 and £2,500,000 respectively, making a total of £48,809,300. I append an Abstract of the Estimates compared with the grants for 1913–14 revised to include the Supplementary Estimate lately authorised by the House of Commons. From this Abstract it will be seen that the increase upon the estimated expenditure of the current year is £2,740,700. This increase may be accounted for under the following general heads:—

(1) £450,000 for the pay and victualling of a larger number of officers and men (£420,000); and automatic increases of the non-effective Votes (£30,000).

(2) £400,000 for Fuel and Fuel Services due to the increased horse-power of the Fleet, and the continued building up of the Oil Fuel Reserve, including tank vessels and storage.

(3) £300,000 for the development of the Air Service.

(4) £750,000 for increased earnings by contractors under existing contracts upon New Construction (Vote 8).

(5) £800,000 for Guns, Torpedoes and Ammunition, partly through the acceleration of the three 1913–14 battleships (£300,000); partly to provide for larger earnings by the contractors in the execution of existing contracts (£200,000); and for the service of the Fleet, whose guns are increasing in number and size as new ships join, and other charges (£300,000).

(6) £40,700 for miscellaneous minor services.

Provision has been made for the number of officers and men to be increased during the year by 5000 to man the ships now under construction, and to enable the new organisation of the Fleet to be completed step by step with the increasing establishments of foreign Powers; also for the needs of the air service.

The new programme is composed as follows:—

4 battleships,
4 light cruisers,
12 destroyers,

together with a number of submarines and subsidiary craft.

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The total cost of the new programme under Votes 8 and 9 is estimated at £14,817,000, excluding air service, as compared with £18,824,700 for the programme approved by Parliament in 1913–14; and £1,950,000 is taken for the first instalment.

The 1914–15 Estimates, like those of the current year, are heavily burdened by arrears of shipbuilding. The state of the shipyards, the prospects of trade, and the progress of the vessels, make it necessary to allow for heavy earnings by the contractors, and consequent overtaking of arrears. The total amount provided for new construction, excluding air service, under all programmes in Votes 8 and 9 is £18,373,000, as compared with £16,033,000 originally presented in 1913–14 and increased by a Supplementary Estimate to £17,360,000. The new programme commitment being, as stated, £14,817,000, the net reduction of the outstanding liabilities of the Navy on these heads during the year should be £3,556,000.

I attach the usual record of the work done by the Department in 1913–14.

WINSTON S. CHURCHILL.

ADMIRALTY,
March 10, 1914.

[The following names have been assigned to the battleships of the 1914–15 programme: Renown (Fairfield Company), Repulse (Palmer's Company), Resistance (Devonport), Agincourt (Portsmouth). It will be observed that the three R ships will complete eight of the Royal Sovereign class, while the Agincourt will be the sixth of the Queen Elizabeth class.—EDITOR.]

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STATEMENT OF WORK.

SHIPBUILDING.

Between April 1, 1913, and March 31, 1914, the following ships will have been completed and become available for service:—

Battleships: Iron Duke, Ajax, Audacious, Centurion.

Battle-cruisers: Queen Mary, Australia (for the Commonwealth of Australia).

Light cruisers: Fearless, Birmingham, Nottingham, Lowestoft, Sydney (for the Commonwealth of Australia).

Destroyers: Ambuscade, Contest, Sparrowhawk, Spitfire, Hardy, Shark, Paragon, Garland, Lynx, Midge, Ardent, Fortune, Porpoise, Unity, Laertes, Lysander, Lark, Linnet, Laforey, Laurel.

Submarines: E 1, E 2, E 3, E 5, E 6, E 7, E 8, AE 1, AE 2 (for the Commonwealth of Australia).

Miscellaneous: Woolwich, Strenuous, Sturdy, Zealous. Attendant.

On April 1, 1914, there will be under construction:—

13 Battleships (including Malaya).
1 Battle-cruiser.
16 Light cruisers.
30 Torpedo-boat destroyers.
24 Submarines.
A number of vessels for carrying oil fuel and for various Fleet services.

New Construction.

The Centurion, Ajax, Audacious, Iron Duke and Queen Mary have been completed and commissioned. The Marlborough is expected to complete her trials before the end of the financial year. The Benbow and Emperor of India, the other ships of the 1911–12 programme, have been launched.

Of the four battleships of the 1912–13 programme, the Queen Elizabeth and the Warspite have been launched Good progress is being made with the Barham and Valiant, and also with the Malaya, the gift of the Federated Malay States to the Imperial Government.

The five battleships of the 1913–14 programme have been laid down, the Royal Sovereign at Portsmouth, Royal Oak at Devonport,

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Ramillies at Messrs. Beardmore & Co.'s, Resolution at Messrs. Palmer's, and the Revenge at Vickers, Ltd.

The battle-cruiser Tiger, building at Messrs. John Brown and Co.'s, has been launched.

The light cruiser Sydney has been completed and commissioned for the service of the Australian Commonwealth. Machinery for a similar vessel, H.M.A.S. Brisbane, building in Australia, is being constructed at Messrs. Vickers, Ltd., under Admiralty supervision.

Of the four light cruisers of 1911–12 programme, the Fearless and Birmingham have been completed and commissioned, while it is anticipated that the Nottingham and Lowestoft will be completed before April 1, 1914.

Good progiess is being made with the eight light cruisers of the 1912-13 programme. Arethusa and Aurora are both afloat.

The eight light cruisers of the 1913–14 programme have been laid down, Cordelia and Carysfort at Pembroke, Calliope and Conquest at Chatham, Cleopatra at Devonport, Comus at Messrs. Swan, Hunter and Wigham Richardson, Champion at Messrs. Hawthorn, Leslie and Co., and Caroline at Messrs. Cammell Laird. H.M.S. Cordelia was launched February 23, 1914.

Of the twenty destroyers shown above as having been completed this year, twelve of the 1911–12 programme and five of the 1912–13 programme are already delivered; it is anticipated that two others of the 1911–12 programme and one other of the 1912–13 programme will be delivered before the end of March, 1914.

Substantial progress has been made with the construction of 13 destroyers of the 1913–14 programme. It has been decided to build two large destroyers for service as flotilla leaders instead of the remaining three boats of this programme, and orders were placed for these vessels during February of this year.

The steamships Knight Commander, Heliopolis, and Tabaristan, purchased during 1912–13, and renamed Reliance, Mediator, and Diligence, are undergoing conversion into a Fleet repair ship, a hospital ship, and a depôt ship for destroyers, and are in hand. It is expected that these will be completed in 1914–15.

The following additional vessels for service in connection with the transport and supply of oil fuel for H.M. Fleet are under construction: Servitor, Carol, Ferol, Trefoil, Turmoil and Olympia.

Tenders are also under consideration for the construction of three large oil-carrying vessels, to be named Olivia, Olaf and Olna.

A floating dock for destroyers of 2200 tons lifting-capacity building for Portland was launched last month and will be completed early next financial year.

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Administration.

Scotland, which for naval purposes had hitherto been divided between the Nore and Devonport commands, has now been constituted a separate command, under a "Senior Naval Officer, Coast of Scotland," with headquarters at Rosyth.

The navigational section of the Hydrographic Department has been converted into a separate department, and a new office of Director of Navigation created.

A new section of the department of the Director of Naval Ordnance has been formed to carry out certain of the duties hitherto discharged by the staff of the Inspector of Target Practice, whose separate department has been abolished.

A naval officer has been lent to the General Staff at the War Office, and an officer of that staff has been lent to the Admiralty War Staff; an arrangement which has been of advantage to both staffs and reinforces the present closer co-operation between the two services.

Surgeon-General Arthur W. May, C.B., has succeeded Surgeon-General Sir James Porter, K.C.B., as Director-General of the Medical Department of the Navy.

Naval Policy in the Overseas Dominions.

The Australian Naval Station has been handed over to the control of the Australian Commonwealth. H.M.A. Ships Australia (flying the flag of Rear-Admiral Sir George E. Patey, K.C.V.O.) and Sydney left England in July and proceeded to Australia *viâ* the Cape of Good Hope, where they met with a cordial welcome from the Government and people of the Union of South Africa. They arrived at Sydney on October 4th, accompanied by the sea-going vessels of the Royal Australian Navy already on the station, and were accorded a welcome which signalised the assumption by the Commonwealth of full naval responsibility in its own waters. Admiral Sir George F. King-Hall, K.C.B., C.V.O., the outgoing Commander-in-Chief, sailed from Sydney in H.M.S. Cambrian on October 13th, and finally struck his flag at Melbourne a week later.

The two Australian submarines AE 1 and AE 2, the last components of the original Fleet unit to be built in England, are now on their way out to Australia. H.M.A.S. Brisbane and three destroyers are still, however, under construction in the Commonwealth.

The portion of the old Australian station which has not been transferred to the Commonwealth is now known as the New Zealand

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division, and four of H.M. ships are at present serving there. One of these—H.M.S. Philomel—is about to be transferred to the control of the New Zealand Government.

The New Zealand Minister of Defence visited this country in the earlier part of last year to discuss with H.M. Government the problems of naval defence. As a result legislation has been passed in the Dominion Parliament enabling a New Zealand Naval Force to be constituted, and providing for the application to that Force of the Naval Discipline Act, etc. The Admiralty will lend the Philomel for use as a sea-going training ship for the Force, with the necessary complement of officers and men. In a Memorandum laid before the New Zealand Parliament, the Prime Minister of the Dominion explained as follows the intention of the Government, to which effect has since been given by the legislation referred to:— "It is proposed that this ship or any ship that New Zealand may acquire shall be under the administration of New Zealand in peace time, but shall automatically pass under the direct control of the Admiralty immediately on the outbreak of hostilities, or shall be available for Admiralty purposes on any other occasion when urgently required."

The officer in command of the Philomel will be the senior officer of the New Zealand Naval Force, and will advise the New Zealand Government on all matters affecting the organisation of that Force.

It is proposed that the ordinary channel of entry and training for New Zealand Naval cadets shall be through the Royal Australian Naval College, but the two annual recommendations for Osborne will be retained. For the men the effective period of engagement will generally speaking be seven years, during which they will be liable to serve in any ships of the Royal Navy.

Two light cruisers will be retained by the Admiralty in the New Zealand division, and will so far as possible be manned by members of the New Zealand Naval Force, when trained.

A New Zealand Royal Naval Reserve will be constituted on a new basis.

An annual appropriation from Dominion revenues (at present £100,000, the amount of the naval subsidy hitherto paid) is contemplated, the first charge on which will be the pay, etc., of *personnel* of the Naval Force and Reserve, the upkeep of *matériel*, and the cost of stores required. The balance remaining after these charges are met will be paid to the Admiralty in relief of Navy votes.

From April to June H.M.S. New Zealand, the battle-cruiser presented by the Dominion to the Royal Navy, visited the ports of New Zealand and was received everywhere with great enthusiasm.

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On her departure a message from H.M. the King, in response to a telegram from the Dominion Government, expressed his appreciation of the action of the people of New Zealand in presenting the ship to His Majesty's Navy for the defence of the Empire. The ship returned to England *viâ* British Columbia, Mexico, South America, the West Indies, and Nova Scotia, reaching Devonport on December 8th. An account of this cruise has been issued separately as a Parliamentary paper.

In Canada the Government has not obtained Parliamentary sanction for the proposal to build three armoured ships of the most modern type at the charge of the Dominion, and the development of a considered naval policy for Canada is consequently in abeyance.

The South African Division of the Royal Naval Volunteer Reserve was constituted on July 1st last under regulations authorised by the Admiralty and accepted by the Governor-General. At the end of last year the division numbered nine officers and 284 men.

Organisation of the Fleet.

The organisation of the Home Fleets is proceeding in accordance with the statements made to Parliament in 1912, and in conformity with the progress of foreign navies. A squadron of light cruisers in full commission has been formed under a Commodore, and attached to the First Fleet. The Sixth Battle Squadron has been brought to a strength of six ships. The Fourth Cruiser Squadron has been detached for service in the West Atlantic. It will, however, return periodically to Home waters to join in manœuvres, with the exception of the light cruiser Hermione, which is attached to the squadron for station duties.

The First Cruiser Squadron in the Mediterranean has been raised to full strength. The Second Battle-Cruiser Squadron at present comprises three ships, the Invincible being at home refitting. Four light cruisers of the Town Class and a flotilla of sixteen G Class destroyers (Beagles)—known as the Fifth Flotilla—are now on the Mediterranean Station, the older cruisers and destroyers having been withdrawn.

Two battleships have been sent to the East—the Swiftsure as flagship of the East Indies Squadron and the Triumph to Hong Kong in reserve. Two Town Class cruisers have replaced two County Class cruisers in Eastern waters. The China Destroyer Flotilla is now composed of seven destroyers of the E (River) class and one older destroyer.

The limits of the East Indies and China Stations have been

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modified, concurrently with the establishment of the new Australian (Commonwealth) Station with the limits approved at the Imperial Conference, 1911, and Singapore and the waters adjacent now come within the East Indies command.

The first "Fleet unit" of the Royal Australian Navy, composed of one battle cruiser, three light cruisers, and three destroyers (to be joined shortly by two E class submarines) has replaced the old Australian Squadron. The ships of that squadron which still remain in Australasian waters now constitute the New Zealand Division.

H.M.S. Highflyer has been commissioned for the training of special entry cadets.

Fleet Exercises.

The Naval Manœuvres, in which the Army this year co-operated to a larger extent than hitherto, took place at the end of July. The First and Second Fleets and part of the Third Fleet with all the destroyer flotillas in Home waters, and also the First Cruiser Squadron from the Mediterranean, took part.

The Mediterranean Fleet, combined with the Fourth Battle Squadron, part of the First Battle Squadron, the Third Cruiser Squadron and the First Light-Cruiser Squadron, carried out manœuvres in the Mediterranean in November.

Exercises have recently taken place off the coast of Spain, in which detachments of the First and Second Battle Squadrons and the Third Battle Squadron, the First Battle-Cruiser Squadron and the Second Cruiser Squadron took part.

Numerous other exercises of a technical nature have also been carried out during the year.

General Service of the Fleet.

Part of the Third Battle Squadron remained in the Mediterranean until the early summer of last year, the Vice-Admiral Commanding (Sir Cecil Burney, K.C.B., K.C.M.G.) being engaged at first in the blockade of Montenegro by the International Squadron, and subsequently as Senior Officer of the International Force in occupation of Scutari. A force of seamen and marines which was landed from his flagship, H.M.S. King Edward VII., for service at Scutari, was withdrawn after a few weeks on relief by an equal number of troops from Malta. On the departure of the Third Battle Squadron Sir C. Burney remained temporarily as second-in-command of the Mediterranean Fleet, with his flag in a light cruiser, until he left Scutari in October.

The disturbed state of China made it necessary for a short time

last summer to resume some of the naval precautions which were in force during the Revolution. With the exception, however, of a limited patrol of the West River by torpedo-boats, as a precaution against piracy, the dispositions on the station are now normal.

The civil disorders in Mexico have caused anxiety among foreign residents both on the Atlantic and Pacific Coasts during the past year, and Mexican ports have been repeatedly visited by H.M. ships. In December the Rear-Admiral Commanding the Fourth Cruiser Squadron was present at Tampico during a critical period of hostilities, and acted in close co-operation with the American and German naval authorities. H.M. ships Essex and Hermione are at present on the Atlantic coast of Mexico, and H.M. ships Algerine and Shearwater on the Pacific coast. H.M S. Lancaster proceeded to British Honduras in December to assist in the maintenance of public order, which was threatened by the presence in the colony of Mexican citizens intending to enter Mexican territory under arms, and by the disturbed conditions on the other side of the frontier. Bluejackets and Marines were landed in the Colony, and were not withdrawn until order had been effectively established.

H.M. ships Lancaster and Mutine formed part of an international naval force during an insurrection in Hayti last month, and the Captain of the former acted as international senior officer.

The Arms Traffic Blockade in the Persian Gulf has been continued. The principal incident of a military character took place on the Tangistan Coast, one man being killed and several wounded. The disappearance in January, 1913, of a cutter of H.M.S. Perseus, with a crew of one officer, eight men, and a native interpreter, has been the subject of exhaustive inquiries, which have led to the conclusion that the loss of the boat was in all probability due to a gale, and not to hostile action on the part of natives.

Ceremonies and Visits.

His Majesty the King inspected H.M.A.S. Australia, the first flagship of the Royal Australian Navy, at Portsmouth on June 30th, prior to her departure for Australia, and conferred upon the Rear-Admiral commanding the honour of Knight Commander of the Victorian Order.

H.M. ships Lancaster and Liverpool were present in the Mersey in July on the occasion of the opening of the new Gladstone Dock by His Majesty.

The Second Battle Squadron, the First Light-Cruiser Squadron, and the Fourth Destroyer Flotilla assembled at Spithead to welcome the President of the French Republic on his visit to this country in

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June, and the Fifth Battle Squadron and the Fifth Cruiser Squadron were present at Dover to honour his departure.

The combined Fleet cruising in the Mediterranean visited Athens at the end of November, and squadrons of the Home fleets on their way home visited Naples, Toulon and Barcelona. The Fourth Battle Squadron visited Algiers in November. A division of the Second Battle Squadron has recently made a stay of a few days at Palermo.

A visit was paid to Cherbourg in February by the Third Battle Squadron, and another is about to be paid by part of the First Battle Squadron.

Brest was visited by the First Battle-Cruiser Squadron and by the Second Cruiser Squadron in February.

Naval Bases and Works.

The main contract works at Rosyth continue to make satisfactory progress. The small basin and a portion of the reclamation works are practically completed. The masonry work in Docks Nos. 1 and 2 is well forward, while the excavation of Dock No. 3 and the basin is proceeding. The dredging of the approach channel, which has been let as a separate contract, has also made satisfactory progress. A town planning scheme prepared by the Dunfermline Corporation includes certain Admiralty land, and negotiations are proceeding with a view to the development of this land as a residential area for the employees of the new dockyard.

Excellent progress has been made with the defence works at Cromarty, and the main portion of the scheme is now complete. Negotiations are in hand to acquire a site on which to erect permanent accommodation for the Marines who will form the complement.

Of the new locks at Portsmouth, one is in use, and the other is expected to be available in the autumn of 1914. The extension of No. 14 Dock is also expected to be completed at the same time.

Repairs of the Fleet.

The new system under which the standard time for an annual refit is limited to four weeks has been in full operation during the past year, and the strength of the squadrons at sea has thereby been substantially increased. Valuable experience has been gained, and it is hoped that the arrangements now made will enable the system to be continued without imposing undue demands upon the Dockyard officers and staff.

During the year the wages of the principal classes of employees

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in H.M. naval establishments have been increased at an estimated additional cost of rather more than £100,000 per annum.

The number of workmen to be borne on the Established List has also been largely increased.

AIR SERVICE.

During the past twelve months a considerable advance has been made in the Naval Air Service.

Seaplanes have combined for war exercises with the Patrol and Defence Flotillas, and also took part in the naval manœuvres in July, and a flight of naval aeroplanes was employed during Army manœuvres. Considerable success attended the operations of the air-craft in all these exercises.

A cruiser was specially commissioned and fitted out to carry seaplanes during the summer of last year, and a large number of flights were made from her. In consequence of the experience gained in this ship it has been decided to procure a special vessel as seaplane carrying ship.

Progress has been made in the establishment of a chain of seaplane bases round the coast; five such stations have already been completed, and the formation of others is proceeding. Good progress has been made with the design of the seaplane itself and its development into certain standard types for war purposes is proceeding rapidly.

The practical utility of aeroplanes and seaplanes for war purposes is increasingly evident and the experiments in connection with bomb dropping, wireless telegraphy, and gunnery have been continuous.

At certain of the bases round the coast the *personnel* of the Air Service have replaced the Coastguard and are carrying out Coastguard duties in addition to naval air-station work. As the Air Service develops it is hoped that a considerable number of the Coastguard stations may be transferred and economies thereby effected.

Good progress has also been made in the development of airships. The Astra-Torres and Parseval airships ordered last year have been successful, and further orders for ships of this type have been placed.

Two of the leading shipbuilding firms, Messrs. Vickers' and Armstrong's, have undertaken the construction of airships in this country, and have been given orders for four and three airships respectively.

The establishment of an airship station on the Medway, with two sheds of the largest size, is being pressed forward, and should be completed shortly. A site for another station in a suitable position

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has been procured, and the establishment of an inland airship station for training purposes is under consideration.

After full discussion with the War Office it has been decided to amalgamate the naval and military airship sections and to place the control of this branch of the air service wholly under the Admiralty. Arrangements have therefore been made to transfer the Army airships to the Admiralty, and in future all airship work will be carried out by the Navy. Several officers of the Army airship section, with their men, have agreed to transfer to the naval wing for the development of the airship service. Their experience in aeronautical work is valuable and their services will be welcomed by the Navy.

Training in aeroplane work has been continued at the Central Flying School and the Naval Flying School at Eastchurch; and in airship work at Farnborough. The headquarters of the Airship Section will be transferred from Farnborough to the Medway as soon as the new station is completed.

At the Central Flying School four complete courses for naval and military officers have been held since its opening, and a fifth is now in progress. About thirty naval and military officers have been trained in each course, and a number of men of both services have also been trained in air work. In addition, a number of officers have been through short courses at the school. At the Naval Flying School at Eastchurch a large amount of training work has been carried out, particularly in the training of engine-room artificers, artisans, and other ratings in flying and in the general care and maintenance of aeroplanes of all kinds and their engines.

Arrangements for the special entry of civilians as officers and mechanics have been made, and the regulations are about to be issued.

During the year there were three fatal accidents in the Naval Wing, one death being caused by a propeller striking an officer when on the ground, one officer being killed while flying as a passenger with a civilian aviator, and a third officer being killed while flying on duty.

ORDNANCE.

The reserves for the Fleet have been fully maintained.

The armament for air-craft has received attention, and action has been taken.

The manufacture of gun mountings for the ships now building is proceeding satisfactorily, and guns capable of sufficient elevation for use against air-craft are being mounted on board ship.

The production of torpedoes for the Fleet has proceeded satis-

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factorily, and the torpedo factory at Greenock is keeping pace with the growing requirements.

Good progress is being made in the wireless telegraphy of the Fleet, and the experience of its working in the manœuvres last year showed that it is in a high state of efficiency. Experiments are constantly in progress with a view to future developments in the fleets, the submarine flotillas and in air-craft.

The results of the gunnery practices have been satisfactory. The increase in the allowance of ammunition during the past two years has been fully justified.

PERSONNEL.

Important changes have been made in the training of midshipmen and Acting Sub-Lieutenants following on the report of the Committee presided over by Admiral Sir Reginald Custance. More precise instructions have been issued to ensure that the training in sea-going ships shall be so directed as to give the young officers a practical knowledge of seamanship, navigation and pilotage, gunnery, torpedo and engineering, and generally to fit them to perform the duties of a Lieutenant. The regulations for the examinations for the rank of Lieutenant have been revised as follows:—

After two years and four months' service midshipmen undergo examinations at sea in seamanship and navigation, and those who pass are rated Acting Sub-Lieutenant. The examination in seamanship is final. That in navigation is preliminary only. Acting Sub-Lieutenants remain at sea for three months after promotion to that rank, and at the end of that period undergo examinations in gunnery, torpedo and engineering. The examinations in gunnery and torpedo are held at sea, pending further experience, and are preliminary only. The examination in engineering is final and is also held at sea. On completing the foregoing examinations acting Sub-Lieutenants undergo the following short recapitulatory courses in the schools at Portsmouth, the periods given including time for examinations:—

(*a*) Six weeks' gunnery at Whale Island, including field training and shooting courses and training in spotting.
(*b*) Three weeks' torpedo in H.M.S. Vernon.
(*c*) Three weeks in the Navigation School for practical instruction in pilotage, compass adjustments, and other navigational subjects.

At the conclusion of the course in each school the final examination is held.

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The subjects of the various examinations have been revised to meet the new conditions. Before promotion to the rank of Lieutenant a Sub-Lieutenant is required to do duty in the engine room for a minimum period of four months, and to obtain a certificate that he is capable of performing the duties of a junior engineering officer.

The first selection of officers of the common entry system to specialise in engineering was made last autumn, and the class commenced their course at the Royal Naval College, Greenwich, on October 1st.

Fifteen officers completed the War Staff Course in December last. The third War Staff Course commenced at the Royal Naval War College on February 21, 1914.

A Committee, with Rear-Admiral Sir Edmond Slade as President, was appointed last year to consider the training of the Royal Naval War College in the light of the present requirements of the Service and of the recent establishment of the Naval War Staff. The report of the Committee is now under the consideration of the Board.

In accordance with the announcement previously made in Parliament, the system of selection of young warrant officers and petty officers for promotion to commissioned rank has been developed. Forty-four candidates have been promoted to the rank of Mate or Acting Mate, and twenty-two are at present undergoing the preliminary qualifying course for promotion. Two non-commissioned officers of the Royal Marines are undergoing the course to qualify them for the rank of Second Lieutenant in the Royal Marines.

Arrangements have been made to extend to the Engineer Branch the system of promotion from the lower deck to commissioned rank, and it is intended that fifty artificer engineers and engine-room artificers shall be promoted to the rank of Mate (E) during the next five years. Mates (E) will rise to the rank of Engineer-Lieutenant and will then come under the regulations applicable to that rank in all respects.

The number of Supplementary Lieutenants entered from the Mercantile Marine up to December 31st last was fifty-five, and further entries are being made. Authority has been obtained for the payment to these officers of a messing allowance of 2*s.* a day in addition to their pay.

Owing to the growing requirements of the Service it has been found necessary to increase the lists of Captains and Commanders to 280 and 410 respectively. Additions have also been made to the lists of Engineer Officers, Accountant Officers, and Warrant Officers.

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In order to stimulate the flow of promotion in the Accountant Branch voluntary retirement at the age of fifty has been introduced as a temporary measure. A Committee is now sitting to inquire into questions affecting the conditions of service in that branch, with Rear-Admiral Cecil F. Thursby, C.M.G., as Chairman.

A Civilian Oculist has been added to the Medical Consultative Board to advise on questions arising as to the eyesight in the Navy, and the services of Sir John Tweedy, F.R.C.S., have been secured for the first appointment.

A regulation has been introduced allowing Naval Officers to commute part of their pension under certain conditions before reaching the age of forty, provided in each case the officer wishing to commute is certified incapable of further active service. This step puts naval officers on an equality in this respect with officers of the Army.

The rank of Staff Paymaster in the Royal Naval Volunteer Reserve has been instituted.

A new branch of the Royal Naval Volunteer Reserve is being formed consisting of medical students who have completed a certain portiôn of their training but are not fully qualified medical practitioners. These officers will be styled Surgeon Probationers, and it is hoped that they will prove later on a valuable addition to the Reserves of Medical Officers.

It has been decided to enter a limited number of Probationary Midshipmen, Royal Naval Reserve, and to train them in the Fleet with a view to providing officers in the Mercantile Marine competent to take charge of the self-defensive armament of merchant vessels. The course of training will last for a year, and will take place on entry instead of at a later date as heretofore. More than fifty young officers have already been accepted under this scheme.

The arrangement for receiving young Canadian officers for training in His Majesty's Fleet has been continued. Eighteen Cadets completed a year's training in the Berwick of the Fourth Cruiser Squadron in February, and a further batch of eleven cadets has now been embarked. Three Canadian Sub-Lieutenants are also serving in the Fleet.

In the autumn of last year Rear-Admiral Mark Kerr, C.B., M.V.O., was lent to the Greek Government as head of a Naval Mission. His staff comprises six Commanders, one Acting Commander, one Lieutenant qualified in submarines, two Engineer Officers, two Gunners, and one Secretary, all belonging to the Royal Navy, and one Flying Officer attached to the Royal Naval Reserve.

It has been decided that in future officers lent to foreign

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Governments are to be supernumerary to the established lists of Officers of the Royal Navy.

During the financial year 1912–13, 15,844 Naval ratings and 2124 Marines were recruited from the shore through the various recruiting agencies. This exceeds the entry made in the previous year by 4836, and is the largest total yet reached. Recruiting was generally satisfactory during 1912–13, except for electrical artificer, armourer, and carpenter's crew ratings.

Further provision for training of Seaman-Class Boys has been made by the addition of H.M S. Andromeda to the Harbour Training Establishments at Devonport. This ship, with H.M.S. Powerful, has now been formed into a separate training establishment, the whole being renamed H.M.S. Powerful. The establishment comes under the general authority of the Commodore of the Training Service.

The Training Squadron, in which boys receive their preliminary sea training, now consists of eight ships of the Edgar Class, based on Queenstown.

Arrangements are in contemplation for amalgamating the course of training for Signal Boys and Boy Telegraphists, who are at present trained separately at H.M. training establishment, Shotley, and in H.M.S. Impregnable, Devonport, respectively. It is intended to appropriate H.M.S. Ganges and another ship at Harwich to form a Signal and Wireless Training Establishment for these boys. The ratings of both branches will be interchangeable up to the rating of Leading Telegraphist, after which men will be selected to specialise either for the Signal or the Wireless Branch.

The earlier age at which boys are now entered for training for the Seaman, Signal, and Wireless Telegraphy Branches (viz., from 15¼ years), has rendered it desirable that specially well-disciplined and promising boys should be advanced to man's rating before they reach the age of eighteen. Authority has therefore been given for about 25 per cent. of boys to be rated Ordinary Seaman, Ordinary Signalman or Ordinary Telegraphist at 17½. A few advancements are also given, irrespective of age, when the boys leave the Training Service. Advancement before the age of eighteen will be regarded as a reward for the smartest boys, and will only be given to those who are fitted for the rating physically and by knowledge of their duties.

A Committee has been appointed under the presidency of Rear-Admiral the Hon. Horace L. A. Hood, C.B., M.V.O., D.S.O., to consider and report upon the question of the training of young seamen and boys in sea-going ships.

A Committee has been appointed under the presidency of Rear-

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Admiral A. L. Duff, C.B., to consider and report on the present system of advancement of naval ratings.

H.M.A. Ships Australia and Sydney were completed in England last June for service in the Royal Australian Navy, being manned partly by active service ratings, partly by Royal Fleet Reservists and pensioners, and partly by Royal Australian Navy ratings.

Royal Marines.

The numbers borne on March 31, 1914, will be about 16,900. There will also be about 1450 band ranks afloat and under training. Of these numbers 4471 have re-engaged to complete time for pension as compared with 4483 last year. There are over 800 additional of all ranks embarked in H.M. ships as compared with last year.

The training of N.C. officers and men in the higher gunnery ratings is being continued with satisfactory results. The instructional turret at Eastney has been completed and affords great facilities for the preliminary training of all ranks in the working of hydraulic machinery for heavy guns.

A force of Royal Marines was employed in conjunction with Army troops during the naval manœuvres, and took part in the operations.

A Battalion of Royal Marines of about 500 of all ranks underwent a period of training at Aldershot from June 18 to July 8, 1913, and was attached to the 3rd Infantry Brigade. The experience was of great value to both officers and men.

Twenty-one officers have been admitted during the year by direct entry, and are now Probationary Second-Lieutenants at the Royal Naval College, Greenwich. Further entries will be made by competitive examination in June next.

Two non-commissioned officers have been selected for the grant of a commission in the Royal Marines, and are now studying at the Royal Naval College, Greenwich.

At the request of the Admiralty the Army Council has agreed to consider Major-Generals of the Royal Marines for appointment in Army commands and the first appointment has been made. This concession is much appreciated by the Board of Admiralty. The temporary rank of Brigadier-General has been conferred on Colonels-Commandant of the Royal Marine Divisions.

A considerable share of the duties connected with the Royal Flying Corps is being carried out by Royal Marine Officers, several of whom are graded as Squadron or Flight Commanders. Many

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officers of the Corps are also employed on wireless telegraphy and physical training duties.

Officers who entered the Corps before January 1, 1912, have been granted improved rates of pay when embarked afloat.

Regulations have been made for securing the pensions earned by non-commissioned officers and men who continue to serve after 21 years.

Coastguard.

The Coastguard peace complement remains the same as in 1913, and the numbers borne on January 1, 1914, were :—

District Captains, District Paymasters and Staff.	35
Divisional Officers	77
Chief Officers and Men	2,918
	3,030

During the twelve months ended June 30, 1913, assistance was rendered by the Coastguard on 158 occasions. The life-saving apparatus was used twenty-three times, and 175 lives were saved. Three silver medals and two letters of appreciation were presented to the Coastguard by the Board of Trade for special services with the life-saving apparatus.

Calshot Castle, Warsash, Isle of Grain, and Great Yarmouth Coastguard Stations have been transferred to the Air Department, and the necessary arrangements made for the duties hitherto performed at these stations by the Coastguard to be carried out by the *personnel* of the Naval Air Service.

Royal Fleet Reserve.

The total strength of the Royal Fleet Reserve has increased from 25,788 to 27,762, the distribution on December 31, 1913, being as follows :—

——	Class A.	Class B.	Intermediate Class.	Total.
Seamen and Naval Police . .	3,788	8,563	1,087	13,438
Stokers	2,260	5,659	1,290	9,209
Marines	1,745	2,981	389	5,115
	7,793	17,203	2,766	27,762

It is proposed to summon the whole of Classes A and B of the Royal Fleet Reserve for eleven days' training in the Fleet during

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July, 1914, this training to take the place of the ordinary training periods of 1914 and 1915.

Royal Naval Reserve.

The strength of the Royal Naval Reserve (Home) on January 1, 1914, was—

Officers of the Military Branch	1,250
Probationary Midshipmen (new scheme)	51
Commissioned Engineer officers	150
Assistant Paymasters	106
Warrant Engineers	174
Engine-Room Artificers	546
Seaman ratings	10,223
Stoker ratings	5,019

Five hundred and eighteen of the above Military Branch Officers have undergone twelve months' training in the Fleet, and are in receipt of training fees. In addition to these fifty-two are now undergoing this training; also fifty Probationary Midshipmen (new scheme).

The following numbers have undergone courses of instruction and training during 1913:—

—	Short Courses.			Annual or Biennial Training.	
	Gunnery and Torpedo.	Signal.	Strategy.	Three Months.	28 Days.
Officers of the Military Branch	161	10	43	—	329
Assistant Paymasters	—	—	—	—	68
Warrant Engineers	—	—	—	10	—
Engine-room Artificers	—	—	—	49	—
Seaman ratings	—	—	—	597	3,041
Stoker ratings	—	—	—	211	1,368

The institution of a Wireless Telegraphy Branch of the Royal Naval Reserve has also been approved. Enrolments will commence shortly.

The reports on officers and men under training continue to be satisfactory.

Signal instruction to officers and men of the mercantile marine has been given at London, Liverpool and Glasgow. This scheme is

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still experimental, and it will shortly be decided whether these signal schools are to be put on a permanent basis.

The strength of the trawler section of the Royal Naval Reserve on January 1, 1914, was:—

Skippers 108; Second Hands 152; Deck Hands 343; Enginemen 268; Trimmers 121.

Six hundred and ninety-three ranks and ratings have undergone four to eight days' training during 1913. There is still a shortage in deck hands, but the entries for this rating for 1913 were double those for 1912.

As this section of the Royal Naval Reserve has only been in existence about three years, the progress made is satisfactory.

Royal Naval Volunteer Reserve.

The strength of the force is now six divisions, comprising forty-seven companies, the actual numbers being:—

Royal Naval Volunteers.	Establishment.	Strength, Jan. 1, 1914.
Officers	213	178
Honorary Officers	—	25
Petty Officers and Men	4,612	4,127
Permanent Staff—		
Officers	7	7
Petty Officers and Men	82	80

It has been approved for three companies to be formed on the Forth, eventually to become a separate Division, but at present attached to the Clyde Division. The strength of these companies on January 1, 1914, was 129; and it is expected that when a drill ship is obtained, the full strength will soon be reached.

The strength of the various divisions is as follows:—

Division.	Establishment.	Strength, Jan. 1, 1914.
Bristol	413	377
Clyde	1,434	1,243
London	1,025	886
Mersey	719	691
Sussex	617	495
Tyneside	617	613

The following numbers have embarked for 14 or 28 days in fully-

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manned ships of the First Fleet, except forty who were embarked in H.M.S. Bacchante as part complement for manœuvres:—

Officers	71
Petty Officers and men	1,508

Fifty-five Volunteers qualified for Trade Certificates in engine-room and other skilled naval ratings.

The following numbers have undergone courses of instruction during 1913:—

——	Gunnery.	Torpedo.	Strategy.	Signals and Telegraphy.	Electrical Artificer.	Total.
Officers	26	8	5	—	—	39
Petty Officers and Men .	41	21	—	5	1	71

Eight medical officers have undergone a 14 days' course at Haslar Hospital.

A new rank of Surgeon Probationer, R.N.V.R., has been approved. These officers will be entered from medical students going through the hospitals. They will rank with Sub-Lieutenants, R.N.V.R.

It has also been approved for volunteers holding trade certificates to be granted equivalent naval rank and pay when embarked for training.

The reports on officers and men embarked for training and under instruction at the gunnery school, etc., continue to be most satisfactory; nearly 300 more embarked for training in 1913 than in 1912.

The annual inspections of all divisions have been carried out, and the general efficiency of the Royal Naval Volunteer Reserve shows a steady improvement.

Greenwich Hospital.

Considerable sums have been expended in recent years on improvements and repairs to the farm buildings on the northern estates, which are now in excellent order. There are no vacant farms, and the revenue from various sources continues to show a steady increase.

As the geological formation of certain areas in the northern estates indicated the possible existence of oil-bearing shales similar to those of the Forth beds, the ground has been closely examined Shales of this character have been found, but it has yet to be determined whether these or any other beds are of sufficient value

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and importance to justify their development. The inquiry and search are still proceeding.

The scheme of reconstruction of several blocks of property in East Greenwich is well in hand, and the revenue is increasing yearly.

The grants earned by the Royal Hospital School and paid to the funds of the Greenwich Hospital by the Board of Education were again at the highest possible rates.

The recent increase of £6100 on the amount hitherto provided for age pensions to seamen and marines has permitted of the award of about 800 additional pensions during the current financial year.

ADMIRALTY,
March 10, 1914.

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STATEMENT showing the GROSS EXPENDITURE on NAVAL SERVICES for the years 1910–1911 to 1912–1913, together with the ESTIMATED GROSS EXPENDITURE for 1913–1914 and 1914–1915.

—	ACTUAL EXPENDITURE.			ESTIMATED EXPENDITURE.	
	1910–1911.	1911–1912.	1912–1913.	1913–1914.	1914–1915.
	£	£	£	£	£
Gross Expenditure (Navy Votes)	42,441,420	44,384,340	46,882,965	48,333,194	53,573,261
Abate: Annuity under the Naval Works Acts, 1895 to 1905	1,322,752	1,322,752	1,322,752	1,311,558	1,311,558
	41,118,668	43,061,588	45,560,213	47,021,636	52,261,703
Value of Stores drawn from stock, without replacement, in aid of cash expenditure ...	20,750	40,160	66,590	25,000	40,000
Expenditure on behalf of Naval Services from Votes of other Departments	380,413	378,270	385,262	392,423	404,076
TOTAL	41,519,831	43,480,018	46,012,065	47,439,059	52,705,779

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Abstract of Navy

Votes.		Estimates,	
		Gross Estimate.	Appropriations in Aid.
	I.—NUMBERS.		
A.	Total Number of Officers, Seamen, Boys, Coast-guard, and Royal Marines	151,000	....
	II.—EFFECTIVE SERVICES.	£	£
1	Wages, &c., of Officers, Seamen and Boys, Coast-guard, and Royal Marines	8,926,600	126,000
2	Victualling and Clothing for the Navy	3,863,662	771,662
3	Medical Establishments and Services	309,773	17,673
4	Civilians Employed on Fleet Services	115,500	200
5	Educational Services	242,857	67,857
6	Scientific Services	99,648	34,948
7	Royal Naval Reserves	493,108	3,208
8	Shipbuilding, Repairs, Maintenance, &c.:		
	Section I.—*Personnel*	4,016,200	26,400
	Section II.—*Matériel*	7,736,800	649,400
	Section III.—Contract Work	14,380,700	92,960
9	Naval Armaments	5,667,550	123,250
10	Works, Buildings, and Repairs at Home and Abroad	3,632,000	36,500
11	Miscellaneous Effective Services	532,034	8,334
12	Admiralty Office	492,642	9,142
	Total Effective Services £	50,508,534	1,967,534
	III.—NON-EFFECTIVE SERVICES.		
13	Half-Pay and Retired Pay	1,027,816	24,116
14	Naval and Marine Pensions, Gratuities, and Compassionate Allowances	1,637,151	31,251
15	Civil Superannuation, Compensation Allowances, and Gratuities	399,760	360
	Total Non-Effective Services £	3,064,727	55,727
	GRAND TOTAL £	53,573,261	2,023,261

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Estimates for 1914-1915.

1914-1915.	Estimates, 1913-1914.			Difference on Net Estimates.		Votes.
Net Estimate.	Gross Estimate.	Appropriations in Aid.	Net Estimate.	Increase.	Decrease.	
Total Numbers.			Total Numbers.	Numbers.	Numbers.	
151,000	146,000	....	146,000	5,000	....	A.
£	£	£	£	£	£	
8,800,000	8,537,200	138,000	8,399,200	400,800	....	1
3,092,000	3,729,028	799,028	2,930,000	162,000	....	2
292,100	290,810	18,610	272,200	19,900	....	3
115,300	99,500	....	99,500	15,800	....	4
175,000	228,025	68,325	159,700	15,300	....	5
64,700	97,270	31,070	66,200	....	1,500	6
489,900	480,201	4,201	476,000	13,900	....	7
						8
3,989,800	4,089,500	26,400	4,063,100	....	73,300	Sec. I.
7,087,400	6,462,000	610,400	5,851,600	1,235,800	....	Sec. II.
14,287,800	12,333,790	107,490	12,226,300	2,061,500	....	Sec. III.
5,544,300	4,521,600	125,600	4,396,000	1,148,300	....	9
3,595,500	3,481,500	33,500	3,448,000	147,500	....	10
523,700	504,005	9,405	494,600	29,100	....	11
483,500	459,062	9,062	450,000	33,500	....	12
48,541,000	45,313,491	1,981,091	43,332,400	5,283,400	74,800	
1,003,700	1,022,094	16,294	1,005,800	...	2,100	13
1,605,900	1,588,186	26,086	1,562,100	43,800	....	14
399,400	409,423	423	409,000	....	9,600	15
3,009,000	3,019,703	42,803	2,976,900	43,800	11,700	
51,550,000	48,333,194	2,023,894	(a) 46,309,300	5,327,200	86,500	

Net Increase £5,240,700

(*a*) The true Estimate of Expenditure for 1913–1914 is £48,809,300, including the Supplementary Estimate (Parliamentary Paper, No. 112, dated 20th February 1914). Compared with this figure the Estimate of 1914–1915 shows:—

Net Increase £2,740,700

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Statement of the Principal Points of Difference between the Estimates for 1913–1914 and those for 1914–1915.

INCREASES.		£
Wages, &c., of Officers, Seamen and Marines		383,900
Victualling and Clothing for the Navy		157,800
Medical Establishments and Services		19,700
Civilians Employed on Fleet Services		15,800
Educational Services		15,300
Royal Naval Reserves		12,900
Naval Stores for the Fleet		312,800
Fuel, &c., for the Fleet		1,030,500
Propelling Machinery for His Majesty's Ships and Vessels (Contract)		993,297
Air-craft (Contract)		261,700
Armour for His Majesty's Ships and Vessels (Contract)		463,139
Repairs and Alterations by Contract of Ships, &c.		32,000
Gun Mountings and Air-Compressing Machinery (Contract)		449,112
Machinery for His Majesty's Shore Establishments (Contract)		78,800
Naval Ordnance Establishments, and Naval Ordnance Stores		1,145,950
Works, Buildings, and Repairs		147,500
Miscellaneous Effective Services		29,350
Non-Effective Services		25,950
Decrease in Amount of Contribution from the Australian Commonwealth towards Naval Expenditure		41,600
Decrease in the Amount of Repayment from the Government of India on account of Services rendered by His Majesty's Ships engaged in the Suppression of the Arms Traffic in the Persian Gulf		18,000
Admiralty Office		29,358
Miscellaneous Increases		12,487
	£	5,676,943
DECREASES.	£	
Wages of Artificers in His Majesty's Dockyards	82,765	
Increase in Amount of Receipts arising from the Sale of Old Ships	72,700	
Increase in Amount of Receipts arising from the Sale of Unserviceable Naval Stores, Machinery, Gun Mountings, &c.	47,700	
Auxiliary Machinery, for His Majesty's Ships and Vessels (Contract)	6,261	
Hulls of Ships (Contract)	221,817	
Inspection of Contract Work	5,000	
		436,243
Net Increase	£	5,240,700

STATEMENT showing the Total Estimated EXPENDITURE for the NAVAL SERVICE, including Amounts provided in the NAVY ESTIMATES, as well as in the CIVIL SERVICE and other ESTIMATES, for the following Services:—

———		1914–1915.	1913–1914.
		£	£
NAVY ESTIMATES:			
Estimated Expenditure (after deducting Appropriations in Aid)		51,550,000	46,309,300
CIVIL SERVICE ESTIMATES: (a)			
Estimated Expenditure under—			
Class I. Vote 10.—Public Buildings, Great Britain:	£		
Maintenance and Repairs, including New Works, Alterations, &c.	14,140		
Rents, Insurance, Tithes, &c.	3,235		
Fuel, Light, Water, &c.	6,500		
Furniture	4,500		
		28,375	27,190
Class I. Vote 11.—Surveys of the United Kingdom		5,490	4,550
„ I. „ 14.—Rates on Government Property		156,000	153,500
„ I. „ 15.—Public Works and Buildings, Ireland:			
Coastguard, viz.:	£		
Purchase of Sites	350		
New Works and Alterations, including Naval Reserve Stations	2,167		
Maintenance and Supplies	5,265		
Naval Reserve, viz.:			
Maintenance and Supplies	20		
		7,802	11,273
Class II. Vote 8.—Board of Trade:			
Staff and Incidental Expenses in connection with the Royal Naval Reserve Force		3,042	3,250
„ II. „ 9.—Mercantile Marine Services:			
Staff and Incidental Expenses in connection with the Royal Naval Reserve Force		2,500	2,500
„ II. „ 13.—Government Chemist:			
Analysis of Food, &c.		2,350	400
„ II. „ 15.—Exchequer and Audit Department (Cost of Audit):	£		
Navy Cash Accounts	5,548		
Expense and Manufacturing Accounts	4,217		
Store Accounts	3,176		
		12,941	13,143
Class II. Vote 24.—Stationery and Printing		120,000	112,000
„ III. „ 1.—Law Charges, England		13,816	17,052
Maintenance of Naval Prisoners:			
„ III. „ 8.—Prisons, England and the Colonies		790	1,260
„ III. „ 11.—Law Charges and Courts of Law, Scotland		50	100
„ III. „ 14.—Prisons, Scotland		200	200
„ III. „ 15.—Law Charges and Criminal Prosecutions, Ireland		15	70
„ III. „ 21.—Prisons, Ireland		385	383
REVENUE DEPARTMENT ESTIMATES:			
Vote 1.—Customs and Excise.—Percentage for provision of funds for District Paymasters of the Coastguard, &c.		360	252
Vote 1.—Customs and Excise.—Staff and Incidental Expenses in connection with the Royal Naval Reserve Force		3,300	3,300
Vote 3.—Post Office		46,660	42,020
Total	£	51,954,076	46,701,723

(a) Provision is also made in the Estimate for Osborne (Class I., Vote 2) for expenditure in connection with the treatment of invalid Officers of the Navy in the Convalescent Home at Osborne, and in the Vote for Public Buildings, Great Britain (Class I., Vote 10) for Annuities in repayment of sums advanced for sites and buildings under various Acts.

Note.—In addition to the Services shown above, an annuity of £16,243 18s. is payable to the Commissioners of Woods, &c. from the Consolidated Fund, under the Public Offices Sites Act of 1882 (45 & 46 Vict. c. 32).

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STATEMENT showing the CONTRIBUTIONS from INDIA and the COLONIES towards NAVAL EXPENDITURE.

RECEIVED FROM.	NATURE OF SERVICE.	VOTE. 1	2	3	6	7	8 Section I.	8 Section II.	8 Section III.	9	11	12	13	14	15	TOTAL.
		£	£	£	£	£	£	£	£	£	£	£	£	£	£	£
India	Maintenance of His Majesty's Ships in Indian Waters	28,000	9,100	500	..	..	12,500	10,200	13,000	11,600	2,500	..	4,300	8,300	..	100,000
India	Indian Troop Service (on account of work performed by the Admiralty)	..	..	..	..	..	..	..	..	..	..	3,050	..	..	350	3,400
India	Repayment on account of services rendered by His Majesty's Ships engaged in the suppression of the Arms Traffic in the Persian Gulf	18,200	5,900	150	..	..	..	10,000	4,350	2,600	500	..	1,150	3,150	..	46,000
Australian Commonwealth, Dominion of Canada	Contributions on account of liability for Retired Pay of Officers and Pensions of Men lent from the Royal Navy	..	..	..	..	..	..	..	..	..	..	..	15,000	14,950	..	29,950

Australian Commonwealth	Survey of the N.-W. coast of Australia .	3,900	1,300	..	550	..	200	1,550	..	..	..	..	..	..	..	7,500
Dominion of New Zealand	General maintenance of the Navy . .	26,100	7,700	200	..	..	..	12,800	39,600	2,300	2,900	..	3,600	4,800	..	100,000
Union of South Africa	General maintenance of the Navy . .	18,800	7,800	..	..	..	8,300	15,500	24,000	10,600	..	..	..	..	..	85,000
Newfoundland .	Maintenance of a branch of the Royal Naval Reserve . .	..	..	..	..	3,000	..	..	..	..	..	..	..	..	..	3,000
	Total . . £	95,000	31,800	850	550	3,000	21,000	50,050	80,950	27,100	5,900	3,050	24,050	31,200	350	374,850

VOTE (A).

NUMBERS of Officers, Seamen and Boys, Coastguard, and Royal Marines Borne on the Books of His Majesty's Ships, and at the Royal Marine Divisions.

One Hundred and Fifty-one Thousand.
(151,000.*)

I.—Sea Service.

Under which Vote Provided.	RANKS, &c.	NUMBERS, ALL RANKS. 1914–1915.		1913–1914.		Numbers of all Ranks borne on 1st January, 1914.
	For His Majesty's Fleet:					
	Flag Officers	29		29		
	Commissioned Officers . .	5,304		5,264		
	Subordinate Officers . . .	802		657		
	Warrant Officers . . .	2,082		1,905		
	Petty Officers and Seamen . .	104,487		102,718		
	Boys (Service)	5,374	118,078	4,479	115,052	114,236
	Coastguard:					
	Commissioned Officers . .	101		102		
Vote 1	Chief Officers and Second Mates.	192		198		
	Petty Officers and Seamen . .	2,837	3,130	2,830	3,130	3,015
	Royal Marines (for Service Afloat and on Shore):					
	Commissioned Officers . .	428		422		
	Warrant Officers . . .	85		80		
	Staff Sergeants and Sergeants .	1,353		1,302		
	Band Ranks, Buglers and Musicians	1,801		1,762		
	Rank and File	14,691		14,401		
	Band Boys	227	(a) 18,585	268	18,235	18,042
	Total . . .		139,793		136,417	135,293
	Net Increase		3,376			

* Maximum for the year. The estimated average is 148,500.
(a) Including 140 Officers, &c., Sub-Heads F and H.

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VOTE (A)—*continued.*

II.—OTHER SERVICES.

Under which Vote Provided.	RANKS, &c.	NUMBERS, ALL RANKS. 1914–1915.		NUMBERS, ALL RANKS. 1913–1914.		Numbers of all Ranks borne on 1st January, 1914.
Vote 1	Naval Cadets	914		845		
	Pensioners in Home Ships, &c. .	298		310		
	Recruiting Officers and Ratings (*b*)	67				
	Boys under Training—					
	Seaman Class . . .	7,155		5,972		
	Artificer Class . . .	720	9,154	620	7,747	7,662
Vote 2	For Victualling and Clothing for the Navy	1		1		
Vote 3	For Medical Establishments and Services	778		724		
Vote 5	For Educational Services . .	641		565		
Vote 6	For Scientific Services . .	3		3		
Vote 7	For Royal Naval Reserves . .	75		67		
Vote 8	For Shipbuilding, Repairs, Maintenance, &c.:					
	Section I. . . .	351		284		
	Section II. . . .	6		6		
	Section III. . . .	92		87		
Vote 9	For Naval Armaments . .	60		58		
Vote 12	For Admiralty Office . .	46	2,053	41	1,836	1,916
	Total . . .		(*c*) 11,207		9,583	9,578
	Net Increase		1,624			
	Total, Sea Service . . .	139,793		136,417		
	" other Services . .	11,207	151,000	9,583	146,000	
	Net Increase		5,000			

(*b*) In addition to 123 Marines included under Section I.

(*c*) Including Officers and Seamen	2,675	..	2,421
" Retired Officers and Pensioners (Vote 1) .	343	..	310
" Boys (Training, Seaman Class) . .	7,155	..	5,972
" Boys (Training, Artificer) . .	720	..	620
" Boys (Training, Artisan) . . .	199	..	145
" Royal Marines	115	..	115
	11,207	..	9,583

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VOTE 8.
SHIPBUILDING, REPAIRS, MAINTENANCE, &c.

I.—ESTIMATE of the SUM which will be required, in the YEAR ending 31st March, 1915, to defray the EXPENSES of SHIPBUILDING, REPAIRS, MAINTENANCE, &c., including the COST of ESTABLISHMENTS of DOCKYARDS and NAVAL YARDS at HOME and ABROAD.

DOCKYARD WORK.

SECTION I.—PERSONNEL.—Three Million Nine Hundred and Eighty-nine Thousand Eight Hundred Pounds.

(£3,989,800.)

SECTION II.—MATÉRIEL.—Seven Million and Eighty-seven Thousand Four Hundred Pounds.

(£7,087,400.)

CONTRACT WORK.

SECTION III.—CONTRACT WORK.—Fourteen Million Two Hundred and Eighty-seven Thousand Eight Hundred Pounds.

(£14,287,800.)

(Total of the Three Sections of Vote 8 . . **£25,365,000.)**

II.—SUB-HEADS under which SECTION I., PERSONNEL, of this VOTE will be accounted for.

DOCKYARD WORK. SECTION I.—PERSONNEL.	ESTIMATES. 1914–1915.	ESTIMATES. 1913–1914.	Increase.	Decrease.
Dockyards at Home.	£	£	£	£
A.—Salaries and Allowances . . .	(a) 271,501	261,648	9,853	..
B.—Wages, &c., of Men, and hire of Teams	3,134,879	3,223,044	..	88,165
C.—Wages, &c., of Police Force . .	62,286	61,391	895	..
D.—Contingencies	3,800	3,800	..	..
Naval Yards Abroad.				
E.—Salaries and Allowances . . .	(a) 107,469	109,262	..	1,793
F.—Wages, &c., of Men, and hire of Teams	413,895	408,495	5,400	..
G.—Wages, &c., of Police Force . .	21,640	21,130	510	..
H.—Contingencies	730	730	..	..
£	4,016,200	4,089,500	16,658	89,958
Deduct,— I.—Appropriations in Aid . . .	26,400	26,400	..	..
£	3,989,800	4,063,100	16,658	89,958
		Net Decrease	. £73,300	

(*a*) These amounts include the sums of £45,864 for pay of Inspectors of Trades and Senior Draughtsmen at Home and £14,81[illegible] for pay of Inspectors of Trades Abroad, which is charged direct to the cost of shipbuilding.

Note.—Provision has been made for New Construction in the above Vote to the extent of—

Section 1	£1,220,785
„ 2	788,705
„ 3	13,273,460
	£15,282,950

The details of the total anticipated Expenditure on New Construction will be found on page 433.

The difference (£111,844) between the provision under Section III. of the Vote (£13,273,460) and the amount shown in the Programme (£13,161,616) is due to the estimated withdrawals from Stock of transferable auxiliary machinery, gun mountings and steamboats during the year being less than the cash payments for like articles brought into Stock in the same period.

In addition to the Cash Vote of £7,087,400 under Section II., stocks of Naval Stores purchased in previous years will be drawn upon without replacement during 1914–1915 to the extent of £20,000.

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VOTE 8.—SHIPBUILDING, REPAIRS, MAINTENANCE, &c.—*continued.*

II.—SUB-HEADS under which SECTION II., MATÉRIEL, of this VOTE will be accounted for.

	ESTIMATES.		Increase.	Decrease.
DOCKYARD WORK—*continued.*	1914-1915.	1913-1914.		
SECTION II.—MATÉRIEL.				
Naval Stores, &c.	£	£	£	£
A.—Timber, Masts, Deals, &c.	227,000	204,900	22,100	..
B.—Metals and Metal Articles	1,247,000	1,180,900	66,100	..
C.—Coal for Yard purposes	160,000	122,000	38,000	..
D.—Hemp, Canvas, &c.	246,500	202,700	43,800	..
E.—Paint Materials, Oils, Pitch, Tar, Tallow, Boats, Furniture, and other Miscellaneous Articles	800,000	687,200	112,800	..
F.—Electrical, Torpedo, and other Apparatus	598,000	655,600	..	57,600
G.—Freight	56,000	50,000	6,000	..
H.—Rents, Water, &c., Dockyards at Home, and Naval Yards Abroad	42,200	41,800	400	..
I.—Gas and Electric Current, Dockyards at Home and Naval Yards Abroad	13,300	12,400	900	..
£	3,390,000	3,157,500	290,100	57,600
Deduct,—				
J.—Appropriations in Aid.	577,600	550,400	27,200	..
£	2,812,400	2,607,100	262,900	57,600
Fuel, &c., for the Fleet.				
K. I.—Fuel, Lubricating Oils, &c., for the Fleet	3,609,300	2,610,500	998,800	..
K. II.—New Craft and Machinery for Coaling, &c.	465,000	444,000	21,000	..
K. III.—Salaries, Wages, and Allowances	151,500	141,000	10,500	..
K. IV.—Maintenance of Craft for Coaling, &c., and incidental expenses	121,000	109,000	12,000	..
£	4,346,800	3,304,500	1,042,300	..
Deduct,—				
L.—Appropriations in Aid	71,800	60,000	11,800	..
£	4,275,000	3,244,500	1,030,500	..
£	7,087,400	5,851,600	1,293,400	57,600
		Net Increase	£1,235,800	

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VOTE 8.—SHIPBUILDING, REPAIRS, MAINTENANCE, &c.—*continued.*

II.—SUB-HEADS under which SECTION III., CONTRACT WORK, of this VOTE will be accounted for.

	ESTIMATES.		Increase.	Decrease.
	1914-1915.	1913-1914.		
SECTION III.—CONTRACT WORK.	£	£	£	£
A.—Propelling, &c., Machinery for His Majesty's Ships, Vessels, &c.	4,703,759	3,759,362	944,397	..
B.—Auxiliary Machinery, &c., for His Majesty's Ships, Vessels, &c.	176,885	183,146	..	6,261
C.—Hulls of Ships, &c., Building by Contract	3,270,000	3,547,117	..	277,117
C.C.—Air-craft, Building and Repairing by Contract	375,000	(a) 113,300	375,000	..
D.—Armour for His Majesty's Ships and Vessels	2,495,000	2,031,861	463,139	..
E.—Repairs and Alterations by Contract of Ships, &c., and their Machinery and Stores	134,000	110,000	24,000	..
F.—Inspection of Contract Work	141,000	146,000	..	5,000
G.—Gun Mountings and Air-Compressing Machinery	2,553,016	2,105,004	448,012	..
H.—Machinery, &c., for His Majesty's Shore Establishments at Home and Abroad	361,100	277,300	83,800	..
H.H.—Fixed Machinery, formerly provided for by Advances under the Naval Works Acts, 1895 to 1905	..	5,000	..	5,000
I.—Royal Reserve of Merchant Cruisers	151,000	151,000	..	..
K.—Purchase of Ships, Vessels, &c.	20,000	18,000	2,000	..
£	14,380,760	12,333,790	2,340,348	293,378
Deduct,—				
L.—Appropriations in Aid	92,960	107,490	..	14,530
£	14,287,800	12,226,300	2,340,348	278,848
	Net Increase		£2,061,500	

(a) Provided under Sub-heads A., C., E. and G. in 1913-1914.

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VOTE 9.

NAVAL ARMAMENTS.

I.—ESTIMATE of the SUM which will be required in the Year ending 31st March, 1915, to defray the Expense of NAVAL ARMAMENTS.

Five Million Five Hundred and Forty-Four Thousand Three Hundred Pounds.

(£5,544,300.)

II.—SUB-HEADS under which this Vote will be accounted for.

—	ESTIMATES. 1914–1915.	ESTIMATES. 1913–1914.	Increase.	Decrease.
NAVAL ORDNANCE, &c., ESTABLISHMENTS AT HOME AND ABROAD	£	£	£	£
A.—Salaries and Allowances	60,887	60,020	867	..
B.—Wages of Artificers, &c.	405,750	352,480	53,270	..
C.—Wages of Crews of Naval Ordnance Vessels	13,240	13,000	240	..
D.—Wages, &c, of Police Force	37,590	37,430	160	..
E.—Medical Attendance, Rents, Water, Gas, &c., and Contingencies	16,983	17,020	..	37
NAVAL ORDNANCE STORES.				
F.—Guns	1,449,200	1,224,000	225,200	..
G.—Projectiles and Ammunition	2,457,350	1,638,160	819,190	..
H.—Torpedoes and Gun-cotton	298,100	324,900	..	26,800
I.—Small Arms, Torpedo Materials, Maintenance of Vessels, and Miscellaneous	600,450	538,590	61,860	..
K.—Inspection, Proof, Experiments, &c.	293,000	286,000	7,000	..
L.—Freight and Incidental Charges	35,000	30,000	5,000	..
£	5,667,550	4,521,600	1,172,787	26,837
Deduct,— M.—Appropriations in Aid	123,250	125,600	..	2,350
£	5,544,300	4,396,000	1,172,787	24,487
		Net Increase	£1,148,300	

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PROGRAMME of the ESTIMATED EXPENDITURE in CASH, and in NET MAINTENANCE, &c., in (Exclusive of the FLEET

SUB-HEADS under which this ESTIMATED EXPENDITURE will be provisions of Section 1 (2), ARMY

	ESTIMATED EXPENDITURE IN				
	Direct Expenditure.				
	Dockyard Work.		Contract Work, Sec. III.	Total Direct Expenditure. (A)	
	Personnel, Sec. I.	Matériel, Sec. II.			
NEW CONSTRUCTION:	£	£	£	£	
A.—DOCKYARD-BUILT SHIPS—					
Hulls, &c. (c)	978,620	598,130	(f) 1,725,596	3,302,346	1
Machinery	68,365	24,670	1,144,470	1,237,505	2
	1,046,985	622,800	2,870,066	4,539,851	3
B.—CONTRACT-BUILT SHIPS—					
Hulls, &c. (c)	171,150	148,205	(g) 6,377,436	6,696,791	4
Machinery	..	*Cr. 4,000*	3,575,953	3,571,953	5
	171,150	144,205	9,953,389	10,268,744	6
C.—OTHER VESSELS, &c. (d)	2,650	21,700	338,161	362,511	7
TOTAL NEW CONSTRUCTION	1,220,785	788,705	13,161,616	(e) 15,171,106	8
D.—REPAIRS, ALTERATIONS, &c.	1,646,983	892,970	546,226	3,086,179	9
E.—STORES, FOR MAINTENANCE, &c.	..	1,187,100	..	1,187,100	10
F.—ESTABLISHMENT, INCIDENTAL, AND MISCELLANEOUS CHARGES, UNAPPROPRIATED	..	..	..	..	11
TOTAL . . £	2,867,768	2,868,775	13,707,842	19,444,385	12

(c) Including Hydraulic and Transferable Gun Mountings, &c.
(d) Including Harbour Craft, and excluding Torpedo Boats, &c., the value of which is included under other Sub-Heads.
(e) Exclusive of £2,000 provided under Vote 2 for the purchase of a tug for Victualling Yard Service, £17,720 provided under Vote 9 for New Vessels for Naval Ordnance Store Service and £100,000 for Coaling Craft, Vote 8, Section 2, Sub-Head K.
(f) Including £760,196 for Armour. (g) Including £1,724,-04 for Armour.

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VALUES OF STORES issued for SHIPBUILDING, REPAIRS, ALTERATIONS, the Year 1914–1915.
COALING SERVICE.)
accounted for in the NAVY EXPENSE ACCOUNTS, under the AND NAVY AUDIT ACT, 1889.

	1914–1915.		EXPENDITURE AS ESTIMATED IN NAVY ESTIMATES, 1913–1914.			Difference between Direct Expenditure, 1913–1914 (B) and 1914–1915 (A).	
	Establishment, &c., Charges, apportioned.	Aggregate, 1914–1915.	Direct Expenditure. (B)	Establishment, &c., Charges, apportioned.	Aggregate, 1913–1914.	Increase.	Decrease.
	£	£	£	£	£	£	£
1	258,077	3,560,423	(h) 2,997,942	246,149	3,244,091	304,404	..
2	29,082	1,266,587	1,117,748	29,011	1,146,759	119,757	..
3	**287,159**	**4,827,010**	**4,115,690**	**275,160**	**4,390,850**	**424,161**	..
4	119,942	6,816,733	(i) 6,067,104	134,853	6,201,957	629,687	..
5	43,843	3,615,796	2,679,130	42,413	2,721,543	892,823	..
6	**163,785**	**10,432,529**	**8,746,234**	**177,266**	**8,923,500**	**1,522,510**	..
7	6,217	368,728	308,998	7,085	316,083	53,513	..
8	**457,161**	**15,628,267**	**13,170,922**	**459,511**	**13,630,433**	**2,000,184**	..
9	340,736	3,426,915	3,117,815	369,504	3,487,319	..	31,636
10	108,687	1,295,787	1,152,500	110,955	1,263,455	34,600	..
	906,584			939,970			
11	2,751,722	2,751,722	..	2,680,962	2,680,962	..	..
12	**3,658,306**	**23,102,691**	**17,441,237**	**3,620,932**	**21,062,169**	..	..

NET INCREASE ON DIRECT EXPENDITURE . . £2,003,148

(h) Including £749,270 for Armour.
(i) Including £1,272,591 for Armour

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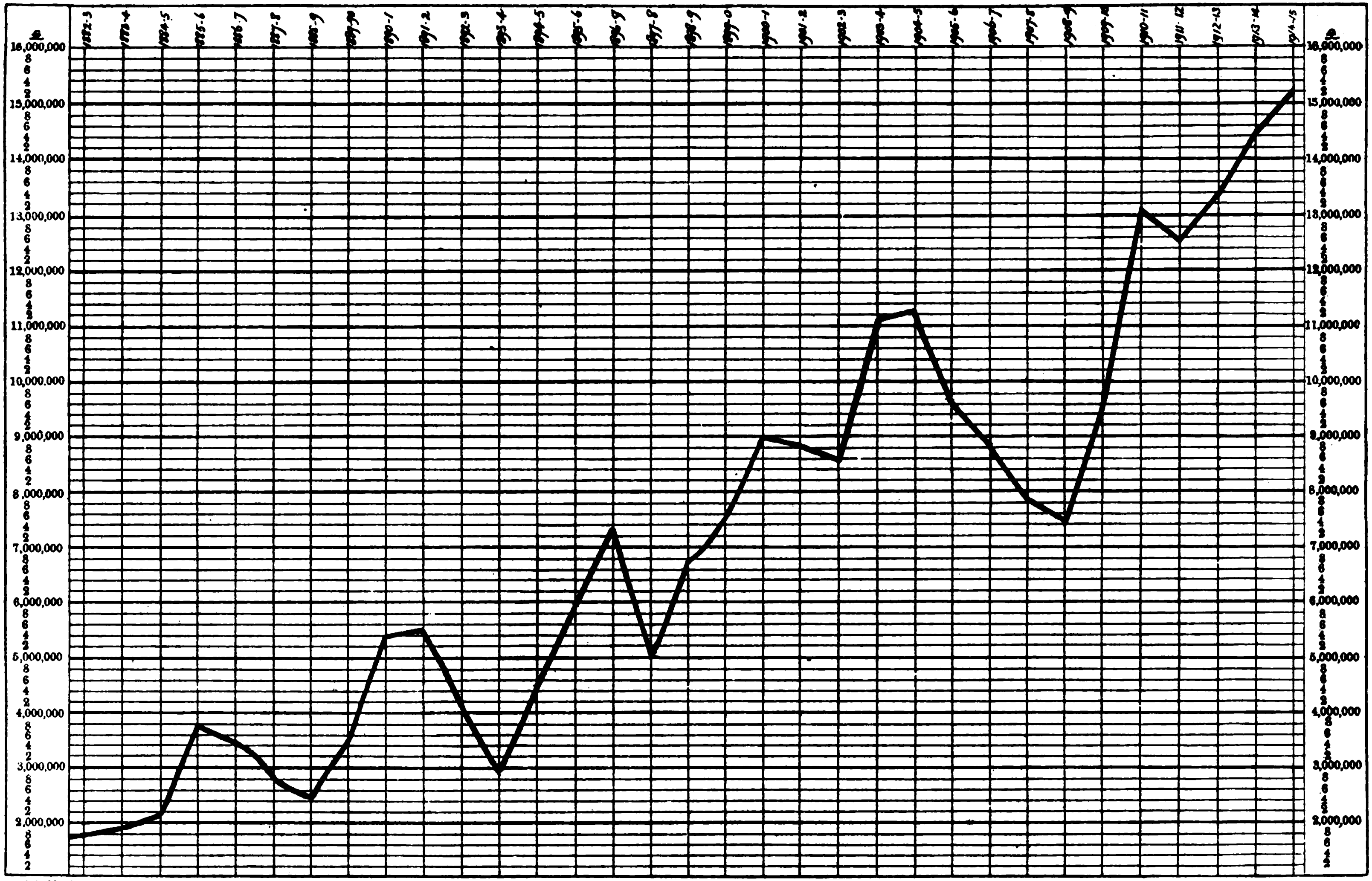
RECAPITULATION OF ESTIMATED EXPENDITURE ON SHIPBUILDING.

SUB-HEADS OF EXPENDITURE.	Charged Direct as Incurred.	Establishment, etc., Charges Apportioned.	New Construction.	Repairs, Alterations, etc.			Stores for Maintenance, etc.	Establishment and Incidental Charges Unapportioned to Ships, etc.		Total Amount of Estimated Expenditure.
				Ships. Large Repairs and Alterations.	Ships. Other Repairs, etc.	Other Naval Services.				
	£	£	£	£	£	£	£	£	£	£
DOCKYARD WORK:										
Section I.—*Personnel* .	2,867,768	1,366,027	1,395,381	369,506	1,389,123	90,132	68,573	448,762	472,318	4,233,795
Section II.—*Matériel* .	2,868,775	1,644,183	911,117	177,512	788,815	59,063	1,227,214	523,169	1,062,846	4,512,958
CONTRACT WORK:										
Section III. . .	13,707,842	648,096	13,321,769	70,446	338,552	143,736	..	33,000	211,627	14,355,938
Total Estimated Expenditure for 1914–1915	19,444,385	3,658,306	15,628,267	617,464	2,516,520	292,931	1,295,787	1,004,931	1,746,791	23,102,691
Totals of Sub-Heads £	**23,102,691**		**15,628,267**	**3,426,915**			**1,295,787**	**2,751,722**		**23,102,691**

DIAGRAM SHEWING THE EXPENDITURE UPON THE CONSTRUCTION OF NEW SHIPS DURING THE 33 YEARS BETWEEN 1882-83 & 1914-15.



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LIST of NEW SHIPS and VESSELS Estimated to be Passed into COMMISSION during the Years 1914–1915 and 1913–1914.

1914–1915.				1913–1914.			
NAME OF SHIP.	Load Displacement in Tons.	Estimated Horse Power.	Number of Guns.	NAME OF SHIP.	Load Displacement in Tons.	Estimated Horse Power.	Number of Guns.
BATTLESHIPS.				**BATTLESHIPS.**			
Queen Elizabeth	..	..	..	Iron Duke	25,000	29,000	22
Warspite	..	..	..	Marlborough	25,000	29,000	22
Benbow	25,000	29,000	22	Ajax	23,000	27,000	10
Emperor of India	25,000	29,000	22	Audacious	23,000	27,000	10
				Centurion	23,000	27,000	10
BATTLE-CRUISER.				**BATTLE-CRUISER.**			
Tiger	..	..	..	Queen Mary	27,000	75,000	8
LIGHT CRUISERS.				**LIGHT CRUISERS.**			
Aurora	..	..	..	Fearless	3,440	18,000	10
Arethusa	..	..	..	Lowestoft	5,440	22,000	9
Cordelia	..	..	..	Nottingham	5,440	22,000	9
Undaunted	..	..	..	Birmingham	5,440	22,000	9
Galatea	..	..	..				
Inconstant	..	..	..				
Royalist	..	..	..				
Penelope	..	..	..				
Phaeton	..	..	..				
TORPEDO CRAFT.				**TORPEDO CRAFT.**			
Torpedo Boat Destroyers 29		Various		Torpedo Boat Destroyers 20		Various	
Submarine Boats 20	..	..	..	Submarine Boats 6	..	..	..
MISCELLANEOUS.				**MISCELLANEOUS.**			
Diligence	7,100	5,000	8	Woolwich	3,380	2,600	4
Reliance	12,500	3,250	..				
Safeguard	875	1,350	..				

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Austro-Hungarian Navy Estimates, 1914-15.

Financial Year Changed from January–December to July–June.

(24 kronen taken as equal to £1.)

	Proposed for July 1914–June 1915.	Voted for Jan.-June, 1914.	Voted for Jan.-Dec., 1913.
ORDINARY EXPENSES.	£	£	£
Pay of Officers, etc.	Details not available.	147,873	278,099
Pay of Men and Clothing Allowances		177,161	320,445
Shore Service		82,579	160,300
Sea Service		248,488	433,004
Minor Shore Establishments		23,334	40,591
Maintenance of Fleet, etc.		411,757	771,542
New Construction (including armament)		126,875	430,477
Ordnance and Flying Services		124,762	240,167
Works		25,583	42,833
Miscellaneous		25,768	46,485
Pensions and Gratuities		83,489	158,049
	2,973,000*	1,477,669	2,921,992
Less various Receipts	—	11,042	20,833
	—	1,466,627	2,901,159
EXTRAORDINARY EXPENSES.			
Clothing	Details not available.	2,083	8,333
Maintenance of Fleet		19,090	58,750
Ordnance and Flying Services		21,458	30,001
Works		68,808	95,808
	221,000*	111,439	192,892
Special Credits for New Construction, etc.	4,166,666	2,279,479	2,850,000
Special Credit for Harbour Works at Pola	41,667	20,833	41,667
Special Credit for Measures taken in view of the Balkan crisis	—	—	1,326,152
Total	7,402,333	3,889,420	7,332,703

* Approximate.

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French Navy Estimates, 1914.

(Converted at £1 = 25 francs.)

Cap. in Estimates, 1914.	Heads of Expenditure.	Credits voted for 1914.	Credits voted for 1913
	SECTION I.		
	General Expenses of Administration—Maintenance of the Navy.	£	£
1, 2, 3, 4	Admiralty Office	187,632	182,533
5, 6	Hydrographic Department	33,031	29,435
7	Inspection of Administrative Services	13,280	12,919
8, 9, 10, 11	Navy Pay, Officers and Men; Mess Allowance, Officers	3,171,510	2,791,266
12, 13	Justice and Police, &c.	108,517	103,817
14	Commissariat Staff	64,779	55,663
15, 16, 17	Storekeeper's Department — Wages and Materials	1,244,391	1,114,307
18, 19	Victualling Department — Wages and Materials	1,173,122	1,113,294
20, 21, 22	Medical and Hospitals	237,384	213,255
23	Constructors' Staff	234,526	215,766
24, 26	Shipbuilding—Maintenance and repair of Fleet; Wages	611,160	613,208
25, 27	Shipbuilding—Maintenance and repair of Fleet; Materials	940,132	837,769
28	Ordnance Staff	101,242	85,105
29, 31	Guns—Repairs and improvements, &c.; Wages	205,640	184,544
30, 32	Guns—Repairs and improvements, &c.; Materials	1,229,888	1,094,979
33, 34, 35	Hydraulic and other Works	158,296	155,657
36	Administrative Staff	195,189	185,808
37	Travelling and lodging allowances	162 977	142,759
38	Charitable and subscriptions	108,080	108,315
39	Allowances to relatives	16,360	—
40	Pay of Reserve Officers	40,552	40,220
41	Secret Service	4,000	4,000
	Carried forward	£10,271,688	£9,284,639

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French Navy Estimates—*continued.*

Cap. in Estimates, 1914.	Heads of Expenditure.	Credits voted for 1914.	Credits voted for 1913.
		£	£
	Brought forward . .	10,271,688	9,284,639
	Section II. *New Construction, Guns, Works.*		
42	Sundry Stores	376,577	468,480
43	Shipbuilding in Dockyards—Wages .	640,360	588,200
44	" " Materials .	2,614,000	2,414,760
45	" by Contract . . .	1,903.558	1,727,080
46	Torpedoes and Mines	307,200	530,000
47	Machinery, large tools, and workshops .	599,840	599,480
48	New guns and renewals—Wages . .	111,694	109,742
49	" " Materials . .	2,396,927	2,160,604
50	" machinery, tools, and workshops	182,880	196,000
51, 52, 53	New Works, including defence of military ports and bases of operations . .	375,568	577,268
54	Aviation	37,760	30,792
		£19,818,052	£18,687,045

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Programme of New Construction, to be continued or undertaken in 1914.—Building in Dockyards.

Class.	Names of Ships.	Where Building.	Date of Commencement.	Proposed Date of Completion.	Estimated Cost.	Probable Expenditure in 1914.
					£	£
Battleships	Jean Bart	Brest	1910	1913	2,470,182	48,698
	Courbet	Lorient	1910	1913	2,428,514	37,098
	Bretagne	Brest	1912	1915	2,586,070	698,757
	Provence	Lorient	1912	1915	2,575,363	700,468
	Flandre	Brest	1913	1916	3,002,480	1,089,680
	Gascogne	Lorient	1913	1916	2,986,480	1,085,680
Torpedo-boat Destroyers	Bisson Renaudin	Toulon	1911	1913	275,123	3,040
	Protet	Rochefort	1911	1913	141,953	3,562
	Commandant Lucas	Toulon	1911	1914	142,072	10,471
	Lestin Roux	Rochefort	1913	1915	279,436	104,177
Submarines	Clorinde Cornélie	Rochefort	1910	1914	147,762	4,760
	Gustave Zédé Néréide	Cherbourg	1911	1914–15	267,2[illegible]8	33,612
	Amphitrite Astrée	Rochefort	1912	1914	160,547	27,024
	Artémis Aréthuse Atalante Amaranthe	Toulon	1912	1914–15	320,864	91,402
	Ariane Andromaque	Cherbourg	1912	1914	155,082	29,720
	Bellone	Rochefort	1912	1914	95,502	34,351
	Hermione Gorgone	Toulon	1913	1914–15	187,054	105,223
	Dupuy-de-Lôme Sané	Toulon	1913	1915	251,029	114,143
	Diane Daphné	Cherbourg	1913	1915	245,418	130,543
	Joessel Fulton	Cherbourg	1914	..	271,470	65,667
	Laplace	Rochefort	1914	..	132,355	46,425
	Lagrange Regnault	Toulon	1914	..	401,744	109,307
	Despatch-vessel, to replace Ibis	—	..	..	47,304	36,264
	Total building in Dockyards		..	..	£19,571,072	4,610,072

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Programme of New Construction, to be continued or undertaken in 1914.—Building by Contract.

Class.	Names of Ships.	Where Building and to be Completed.	Date of Commencement.	Proposed Date of Completion.	Estimated Cost.	Probable Expenditure in 1914.
					£	£
Battleships	France	St. Nazaire—Brest	1911	1914	2,552,641	524,113
	Paris	La Seyne—Toulon	1911	1914	2,555,135	529,150
	Lorraine	St. Nazaire—Brest	1912	1915	2,683,582	964,445
	Languedoc	Bordeaux—Toulon	1913	—	3,079,978	1,183,296
	Normandie	St. Nazaire—Brest	1913	—	3,076,970	1,268,144
	P″	—	—	—	3,079,600	840,000
Scouts	C 1, C 2, C 3	—	—	—	2,160,840	600,000
Torpedo-boat Destroyers	Capitaine Mehl	St. Nazaire—Lorient	1910	1913	124,677	5,640
	Commandant Bory	Lorient	1910	1914	120,637	4,720
	Magon	"	1911	1913	124,103	4,800
	Mangini	Toulon	1911	1913	123,414	4,200
	M 88	—	1913	1915	139,954	45,918
Mine-layer	—	—	1914	—	73,506	14,000
River Gunboat	Balny	—	1913	—	26,856	14,852
Oil-ship, about 11,000 tons	—	—	1913	1914	102,692	82,692
Mine-sweepers	—	Toulon	1913	1914	55,678	34,478
Total building by Contract					£20,080,263	6,120,448

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German Navy Estimates, 1914.

(Converted at £1 = 20·43 marks.)

Ordinary Permanent Estimates.

Heads of Expenditure.	Estimates for the financial year 1914.	Granted for the financial year 1913.
	£	£
Imperial Navy Office	124,534	119,955
Admiral Staff	16,318	17,792
Look-out Stations and Observatories	24,026	22,457
Station Superintendencies	46,720	45,742
Administration of Justice	11,412	11,234
Naval Chaplains and Garrison Schools	11,980	10,884
Navy Pay	2,529,127	2,331,740
Maintenance of Ships in Commission	3,279,001	2,792,560
Victualling	235,336	176,540
Clothing	42,730	29,145
Garrison Works and Administration	89,760	72,578
" Building Materials	53,468	49,554
Lodging Allowance	232,921	219,470
Medical Department	198,270	181,525
Travelling Expenses, Freight Charges, &c.	251,052	221,635
Training Establishments	39,274	35,956
Maintenance of Fleet and Docks	2,052,113	1,872,640
Ordnance and Fortification	1,305,752	1,196,063
Accountants' Department	73,662	67,625
Pilotage, Coastguard, and Surveying Service	51,844	48,928
Miscellaneous Expenses	143,331	130,361
Administration of Kiau-chau Protectorate	7,859	7,698
Total of Ordinary Permanent Estimates carried to Summary, next page	10,820,490	9,662,082

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German Navy Estimates—*continued.*

Special Ordinary Estimates.

Shipbuilding Programme for the Financial Year 1914.

For the Construction of—		£
Battleship Grosser Kurfürst (Ersatz Kurfürst Friedrich Wilhelm)	final instalment	244,738
„ Markgraf (Ersatz Weissenburg)	„ „	244,738
„ König (S)	„ „	244,738
Large cruiser, Derfflinger (K)	„ „	252,079
Battleship Kronprinz (Ersatz Brandenburg)	3rd instalment	440,529
Large cruiser, Ersatz Kaiserin Augusta	„ „	416,055
Small cruiser, Ersatz Irene	final instalment	73,420
„ Graudenz (Ersatz Prinzess Wilhelm)	„ „	73,420
Battleship Ersatz Wörth	2nd instalment	513,954
„ T	„ „	513,954
Large cruiser, Ersatz Hertha	„ „	538,420
Small cruiser, Ersatz Gefion	„ „	122,370
„ Ersatz Hela	„ „	122,370
Gunboat C	„ „	14,684
Imperial Yacht Ersatz Hohenzollern	final instalment	244,738
Ship for raising sunken vessels	2nd instalment	73,420
Battleship, Ersatz Kaiser Friedrich III.	1st instalment	342,633
Large cruiser, Ersatz Victoria Luise	„ „	293,685
Small cruiser, Ersatz Gazelle	„ „	122,370
„ Ersatz Niobe	„ „	122,370
Torpedo-boat division	final instalment	479,687
„ „	1st instalment	489,475
Submarines, construction and experiments		930,005
Alteration and improvement of large cruisers		58,736
„ „ small „		39,158
„ „ torpedo vessels		137,055
Total		£7,148,801

Summary.

Heads of Expenditure.	Estimates for the financial year 1914.	Granted for the financial year 1913.
	£	£
Ordinary Permanent Estimates	10,820,490	9,662,082
New Construction and Alterations	7,148,801	7,594,224
Armaments, Torpedoes, and Mines	3,760,181	3,729,026
*Other items	1,714,657	2,056,572
Total	£ 23,444,129	23,041,904

* Including improvement of docks at Wilhelmshaven, Kiel, and Danzig, coast fortifications and other buildings on North Sea and Baltic coasts, harbour for small vessels at Heligoland, &c.

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Italian Navy Estimates, 1914-15.

FINANCIAL YEAR 1ST JULY, 1914, TO 30TH JUNE, 1915.

(Converted at £1 = 25 lire.)

Heads of Expenditure.	Estimates, 1914-1915.	Revised Estimates, 1913-1914
ORDINARY GENERAL EXPENDITURE.	£	£
Admiralty	87,920	90,060
Pensions	459,300	427,300
Expenditure on the Mercantile Marine for subsidies, &c.	1,389,579	1,217,600
Lighthouses, signal stations, &c.	64,404	64,404
Total	£2,001,203	1,799,364
ORDINARY EXPENDITURE FOR NAVAL SERVICES.	£	£
General Staff of the Navy	228,705	176,000
Corps of Engineers	24,632	77,260
Medical Service	33,136	35,600
Commissariat Service	32,571	38,400
Pay of Officers, and Wages and Clothing of Men	840,460	824,928
Gratuities, &c.	209,460	217,000
Forts—*Personnel*	26,400	24,000
Telegraph Service—*Personnel*	20,440	18,000
„ „ *Matériel*	7,600	7,360
Police (Dockyards)	21,200	19,981
Salaries and Travelling Expenses	56,920	50,520
Barracks, Maintenance, Lighting, etc.	11,800	10,800
Rents and Water Royalties	4,000	3,320
Ships fitting out, &c.	492,000	462,668
Fuel and Stores for Ships in Commission	482,000	409,000
Victualling	628,000	584,000
Hospital Services	38,880	35,200
Naval College and Engineering School	28,280	20,280
Scientific Services—*Personnel*	8,200	7,680
„ „ *Matériel*	8,400	7,672
Wireless Telegraph Stations, Benadir and Eritrea, and School of Telegraphy, Rome	16,000	16,000
Air Department—*Personnel* and *Matériel*	16,000	16,000
Workshops, Fortifications, and Stores—*Personnel*	74,200	74,200
Technical Department (Civil)—*Personnel*	40,400	39,960
Naval Constructors	32,560	32,560
Office Expenses and Civil Staff	9,116	9,116
Law Charges	1,344	1,344
Transport of Materials	11,000	9,600
Works Department—Repairs	96,640	95,440
Plant, Machinery and Tools; Reconstruction and maintenance of Workshops	74,200	74,200
Electric Power, Fuel and Stores for Shore Establishments	88,000	88,000
Materials for construction of new Ships and maintenance of existing Ships—Hulls, Machinery, and Armaments	3,600,000	3,200,000
Wages and Expenses of Dockyard employés	774,800	800,224
Guns, Torpedoes and Small Arms	150,800	150,800
Coast Defence—*Matériel*	12,000	12,000
Reserve Fund	20,000	20,000
Total (to next page)	£8,220,081	7,669,056

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ITALIAN NAVY ESTIMATES—*continued.*

Heads of Expenditure.	Estimates, 1914-1915.	Revised Estimates, 1913-1914.
EXTRAORDINARY EXPENDITURE.	£	£
Temporary Civil Staff	2,770	3,440
General Expenses and Half Pay	4,400	4,400
Total . . . £	7,170	7,840

SUMMARY.	£	£
Ordinary General Expenditure	2,001,203	1,799,364
„ Expenditure for Naval Services	8,220,084	7,669,056
Extraordinary Expenditure	7,170	7,840
Rent of Lands occupied by Government	114,574	111,613
Lighthouses and Buoys	—	16,000
Supplementary Fund, for Shipbuilding	—	977,303
Purposes other than Shipbuilding	68,352	200,000
Grand Total . . £	10,411,383	10,781,176

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Japanese Navy Estimates, 1914.

FINANCIAL YEAR, APRIL TO MARCH.

(9·8 yen taken as equal to £1.)

The Japanese Navy Estimates for 1914–15, as proposed, amounted to £10,279,835, as compared with £9,910,435 voted for 1913–14 (including supplementary estimates of £49,521 for expenses in connection with the Chinese revolution). Large reductions were made by both Houses, but as no agreement between the two could be arrived at, Parliament was dissolved without the Budget having been passed. It is reported that the 1913–14 Budget, with some small alterations, will be used for 1914–15, and that probably no new ships will be laid down.

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Russian Navy Estimates, 1914.

FINANCIAL YEAR, JANUARY TO DECEMBER.

(9·412 roubles taken as equal to £1.)

Heads of Expenditure.	Proposed, 1914.	Voted, 1913.
	£	£
Administration	349,811	343,967
Pay, Clothing, Harbour Victualling, etc.	1,798,996	1,468,777
Sea Pay, Sea Victualling, Fuel, Stores, etc.	2,715,232	2,115,169
Hydrographic, Lighthouse, Lifeboat, and Pilot Services	660,351	535,714
Shipbuilding (new construction)	10,082,571	9,319,386
Refits, Repairs, and Special Services	1,912,499	1,599,930
Guns, Mountings, Ammunition, etc.	2,693,438	4,085,570
Torpedo, Mining, W.T. and Signalling Material	851,062	904,214
Repairs to Ordnance, Torpedoes, Mines, and W.T. Material	143,934	106,250
Naval Ports and Establishments	4,393,217	4,124,852
Chaplains and Church Expenses	16,281	15,393
Medical Service	179,514	169,682
Educational Services	161,765	156,731
Miscellaneous	75,062	74,020
Pensions and Gratuities	184,131	149,850
Amur River Flotilla	386,874	223,279
Total	£26,604,738	25,392,784

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United States Navy Estimates, 1914–15.

(Converted at £1 = $4·8665, being par, as adopted by Congress.)

Objects of Expenditure and Appropriation.	Estimates for year ending June 30, 1915.	Appropriated for year ending June 30, 1914.
	£	£
Pay of the Navy	8,229,883	8,068,356
Pay, Miscellaneous	205,486	209,203
Contingent, Navy	30,823	9,452
Naval Station (for Lepers), Island of Guam	2,876	2,876
Bureau of Navigation	628,215	615,186
" Ordnance	2,609,370	2,609,370
" Equipment	2,056,920	2,110,345
" Yards and Docks	359,601	314,394
Public Works under Bureau of Yards and Docks		
Public Works under Secretary of Navy (Naval Academy)		
Public Works under Bureau of Navigation (Training Stations and War College)	942,258	893,648
Public Works, Bureau of Ordnance		
" " " Equipment		
" " " Medicine and Surgery		
" " Marine Corps		
Bureau of Medicine and Surgery	137,060	151,440
" Supplies and Accounts	2,031,941	1,970,295
" Construction and Repair	1,717,867	1,780,541
" Steam Engineering	1,232,920	1,251,822
Naval Academy	102,239	120,464
Marine Corps	1,511,004	1,553,115
Increase of Navy:—		
Construction and Machinery	3,942,796	4,072,378
Torpedo-boats and Submarines	564,187	689,052
Armour and Armament	3,306,483	2,409,163
Equipment	63,906	88,356
Total	£29,675,835	£28,919,456

The Naval Appropriation Bill was passed by Congress on May 7, 1914, authorising the construction of two battleships, six torpedo-destroyers, one seagoing submarine torpedo-boat, three coast defence submarine torpedo-boats, and four submarines, at a total cost, including armour and armament, of £7,491,367.

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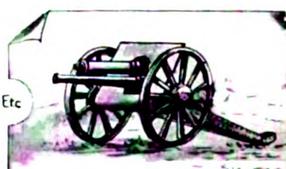
SIR W. G. ARMSTRONG, WHITWORTH & CO., LTD.

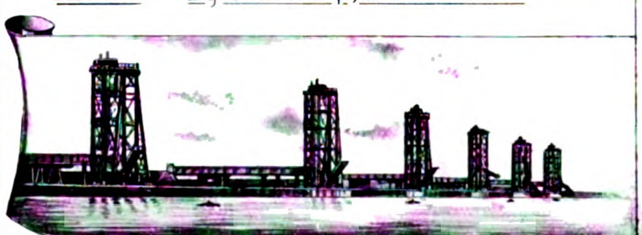
Elswick Works, Newcastle-upon-Tyne.

The Largest Warship Building Plant in the World.

LIST OF DEPARTMENTS.

ORDNANCE ELSWICK.	Guns, Mountings, Ammunition Torpedo Tubes & all War Material
STEEL DEPT ELSWICK.	Forgings, Castings, Nickel, Chrome, Vanadium & Tungsten Steel, Stampings &c. High Tensile E.N.C. 30 Steel Tensile stress 80 to 110 Tons per Square Inch, Elongation 14 to 8 % according to treatment.
ENGINE WORKS ELSWICK.	Hydraulic & Electric Cranes, Hoists, Swingbridges, Dock Gates, Sluices, Capstans, Hydraulic & Electric work of all Descriptions.
ELSWICK AND ARMSTRONG SHIPYARDS.	Warships of all Classes, Submarine Boats &c.
WALKER SHIPYARD.	Passenger, Cargo Ships, Ice Breakers, Train Ferry Steamers, Oil Ships, Docks, &c.
SCOTSWOOD WORKS.	Shell, Fuzes, Primers and Explosives.
MOTOR CAR DEPARTMENT	A.W. Touring Cars &c. Cars de Luxe, Motor Vehicles for Transport, Motor Tractors, &c.
OPENSHAW WORKS, MANCHESTER.	Manufacture of Armour Plates of all sizes, Steel Works High Speed Steel, Drills of all descriptions & Machine Tools, Forgings of the Largest Dimensions for Propellor Shafts, Etc
AMMUNITION WORKS ERITH, KENT.	Manufacture of all kinds of Ammunition, Fuzes for Detonator and Mining purposes, Etc
AVIATION DEPT ELSWICK.	Manufacturers of Aeroplanes, Airships, Seaplanes, Engines for Airships, and Accessories.





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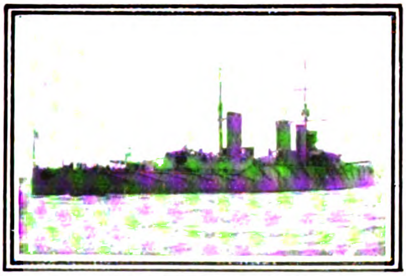

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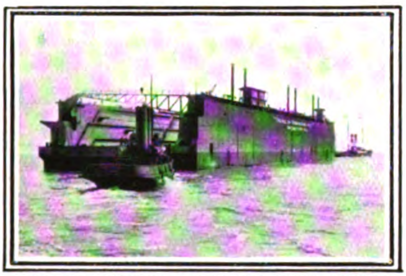

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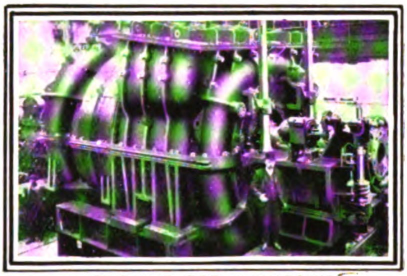

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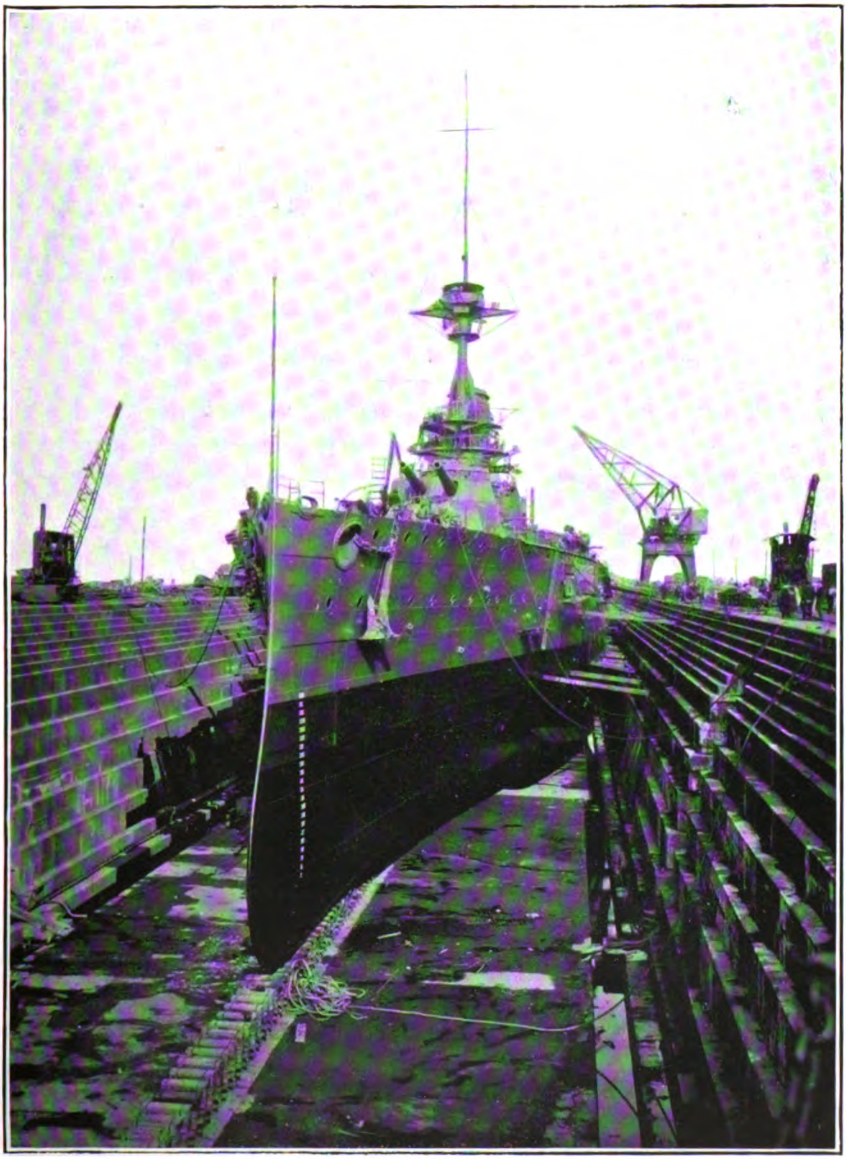

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